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In This Number: THE FEDERAL CAPITAL, its History and Constructional Development

ESTABLISHED 1886

Contract Record and Engineering Review

Vol. 26 Toronto, October 2, 1912 No. 40

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The cost of keeping a mile of macadam road in good condition for one year will pay for the maintenance of 166⅔ miles of concrete road for same period.

The first concrete road was built in Bellefontaine, Ohio, nineteen years ago. The cost of maintenance has averaged **$6 per mile per year.**

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Is it any wonder that the New York Road Commission, in asking for another fifty millions, has promised the people to spend it for concrete highways?

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Canada's era of road building is just beginning. Will she profit by the experience of these other commonwealths? Will she spend her road money on roads that constantly need repair—or will she build permanent roads?

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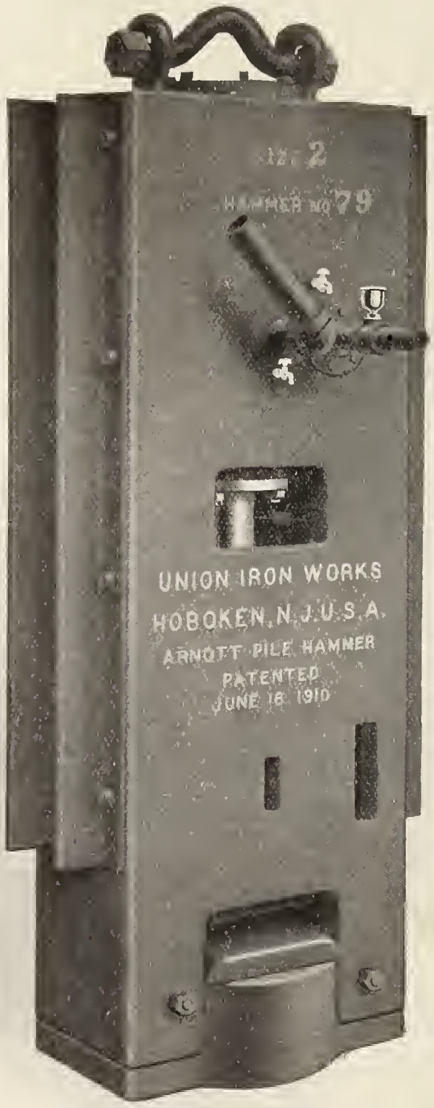

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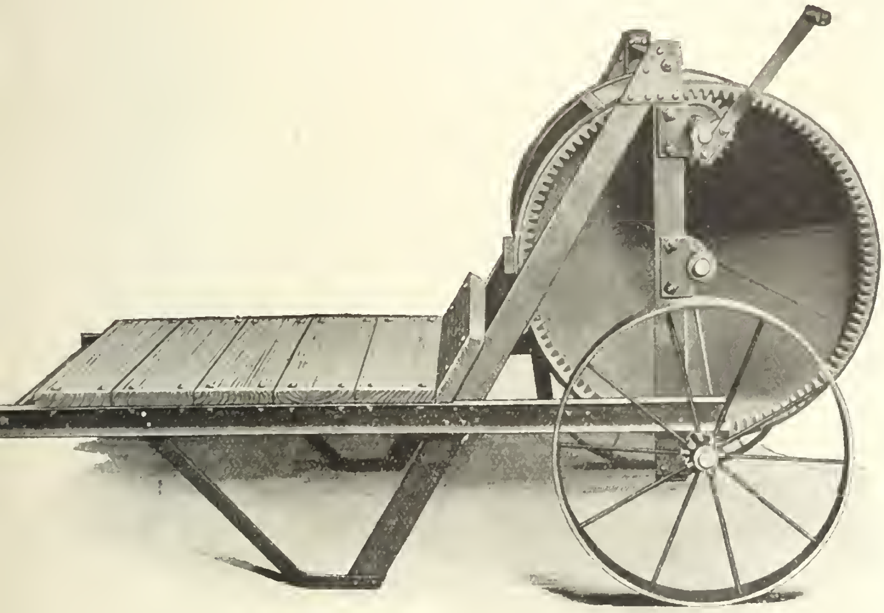

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They are Especially Recommended for Scattered Work, Small Foundation Work Culvert Work, Etc.

The Machine is placed right over the forms; three slow turns of the Drum produces a thorough Mix; the material is then discharged into the forms without shovelling or wheeling.

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Wherever personal possessions must be left in the keeping of strangers, lockers provide the only really satisfactory arrangement of ensuring the safety of goods and the comfort of the possessor.

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form a new type of safety lockers carefully thought out and designed and containing many advantages over the usual class of metal cage hitherto in use, particularly suitable for

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The Standard Sizes and fittings, etc. are carefully calculated to meet every ordinary requirement.

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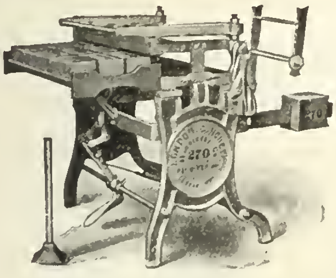
CONCRETE MACHINERY

For all classes of work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That is why we are able to supply the contractor with his every requirement, in Machinery for the working of Concrete. Nothing counts like THE PRODUCTION ON A LARGE SCALE.

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TELL US YOUR
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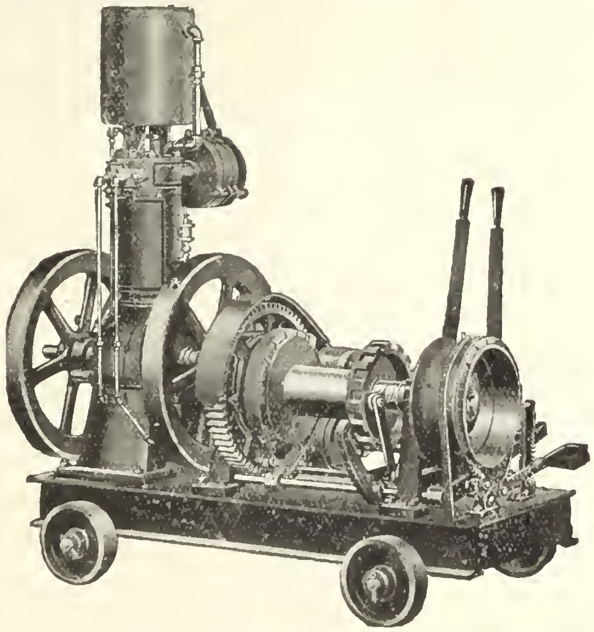
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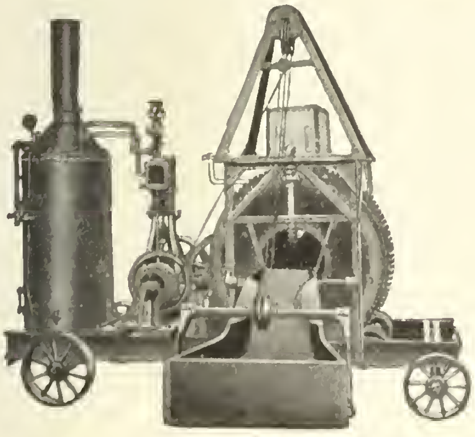
THE LONDON MACHINES are doing ALL WE CLAIM for them.

While we are BUILDING MACHINES we are BUILDING our REPUTATION.

THE ENORMOUS SALE of OUR MACHINES is sufficient proof to us that it pays to build machines of the VERY BEST TYPE.

The CHEAP article we do not make.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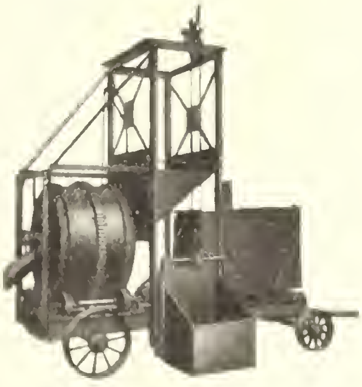
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We are the Largest Manufacturers of Concrete Machinery in Canada

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You Can't Go Wrong

in buying a "Wettlaufer Heartshape Mixer." It does *better* work and does it *quicker* than any mixer at all.

The Heartshape Drum Gives a Positive Mix and a Clean Dump

Strongly constructed and *automatically controlled* this mixer will economise in time and labor right along—it will save you money on every day's work it does, and will give the most satisfactory every-day working service it is possible to obtain in Concrete Mixers.

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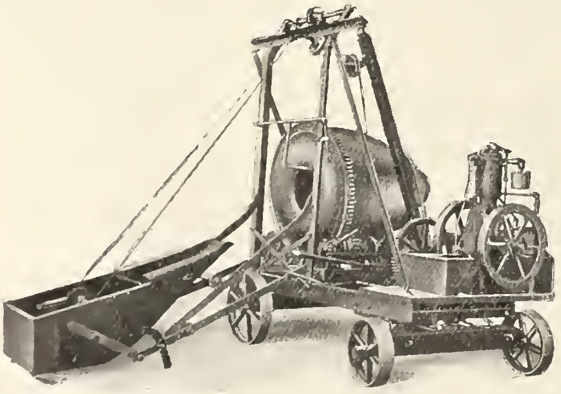

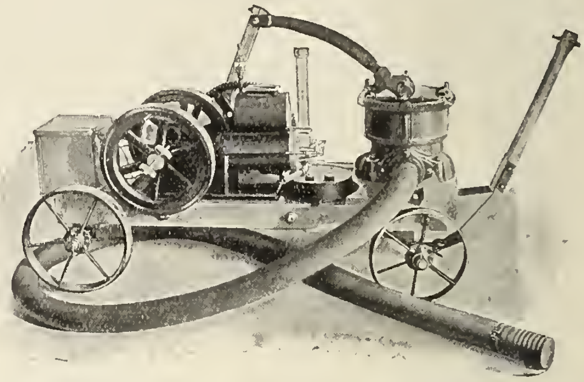

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on a job by using hand pumps—for every day's work, your hand pumps cost you $5.00. Here is a pump that will pump out your abutments and foundations, or any place where you are troubled with water, at an average rate of 2,000 gallons per hour—does *more* than the work of *two men* at a cost of *not more* than *35c. a day*—that is a direct saving of time, labor and money—a saving that will very soon pay the cost of the pump.

Get away from the old hand pumps—avail yourself of the advantages of modern methods—save money and at the same time possess an up-to-date equipment.

No contractor should be without one of these pumps.

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(Continued on page 14)

THIS BROWNHOIST LOCOMOTIVE CRANE

Deposited 1 cu. yd. of concrete per minute

on the construction of the Fourth Avenue Subway, New York City. This was done day after day with a 2 yd. concrete bucket. Four of these cranes were used on this work by the Tidewater Building Company and Thos. B. Bryson, Contractors. Besides handling the concrete, the cranes were used in excavating, unloading sand and gravel (65 yards per hour), and handling all the heavy material.

CONTRACTORS

Use the Brownhoist Crane

because it is built for a hard and continuous service. Delays are expensive to any contractor and he cannot afford to have a crane that is continually breaking down. The Brownhoist Crane is used by contractors in all parts of this country and we want you to investigate its record. Ask the man who has one.

Our Catalog shows the Brownhoist Crane as used on contract work Send for it today.

The Brown Hoisting Machinery Company
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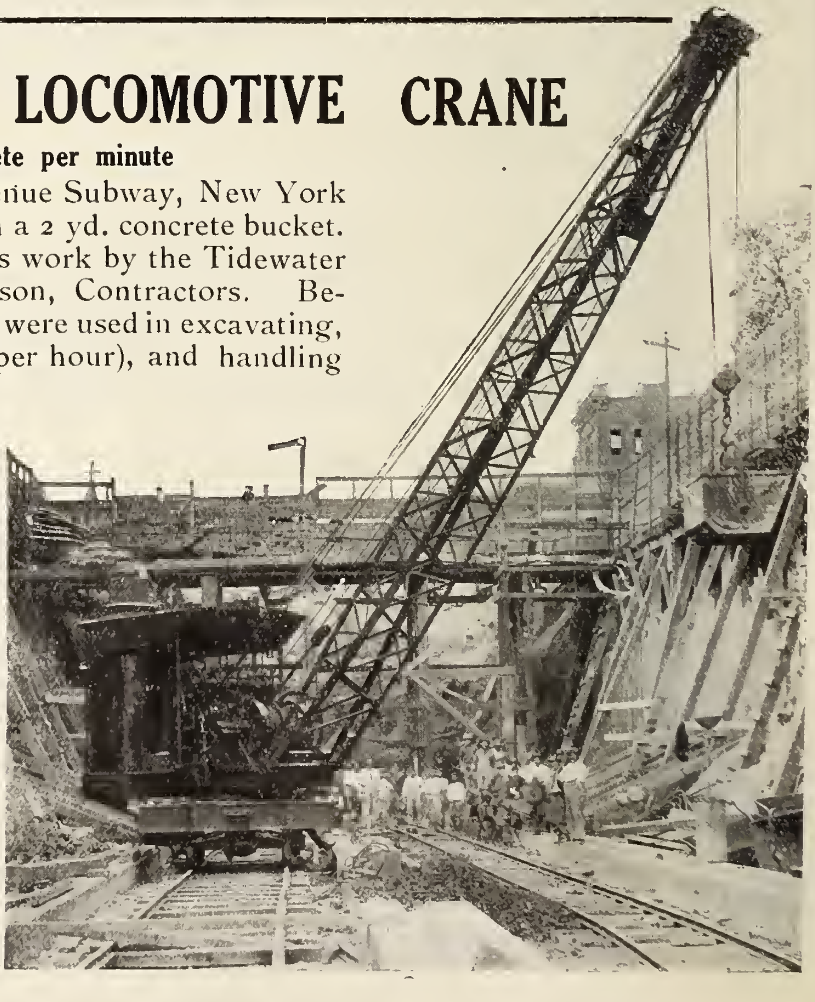

"STANDARD" QUALITY

STANDARD OF CANADA

You Pay for Good Wire

whether you use it or not. If you buy a cheap wire, "made to meet a price," you may pay several times the cost of good wire in replacement of your wiring or of the building in which it is installed.

"Sterling" Rubber Insulated Wire

is made to maintain a standard, not to meet a price. The price, however, is as low as that for which a product of equal quality can be sold.

Our new booklet, **"Sterling,"** *gives valuable information about rubber covered wire. Sent on request.*

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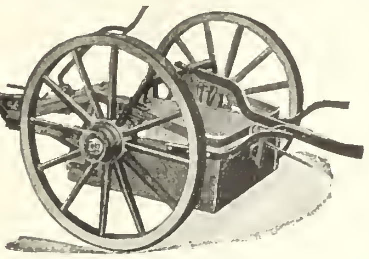
Manufacturers of Electric Wires and Cables of all kinds, all sizes, for all purposes, also Cable Terminals and Junction Boxes, etc.

"STANDARD" ECONOMY

STANDARD OF CANADA

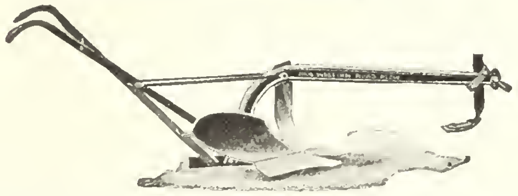
Scrapers and Grading Plows

Backed by a Reputation



Ask any contractor of large experience. He will tell you that for over a quarter of a century there has been maintained a reputation for largest capacity and greatest durability for the

"Western" Line of Wheeled and Drag Scrapers and Grading Plows



The reason is a life-time's experience in actual contract work **combined with** an extensive manufacturing experience and every machine has been perfected after years of the most rigid tests,

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Western Railroad and **Township Plows,** designed for hardest service and proved by many years of use. Any size from 2 to 16 horse power.

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Earth and Stone Handling Machinery **Aurora, Ill.**

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

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1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

Total $376.17 or 5⅔c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

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Hagersville Contracting Co.

Limited

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On Four Great Granaries

To cover the four huge granaries illustrated herewith the Canadian Pacific R. R. engineers chose Barrett Specification Roofs for good and sufficient reasons.

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They further know that they will need no painting or maintenance expense of any kind and that the net cost per year of service will be infinitely lower than could be shown by any other type of roofing.

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A big roof generally means a Barrett Specification Roof, for the reason that the cost of big roofs is carefully scrutinized and ultimate economy carefully considered. Small roof areas ought also to have Barrett Specification Roofs, because they are just as economical and satisfactory there.

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We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired however, the following is suggested: ROOFING —Shall be a Barrett Specification Roof laid as directed in printed specification, revised August 15th, 1911, using the materials specified, and subject to the inspection requirement.

Copy of the Barrett Specification with tracings ready for incorporation into building plans free on request. Address nearest office.

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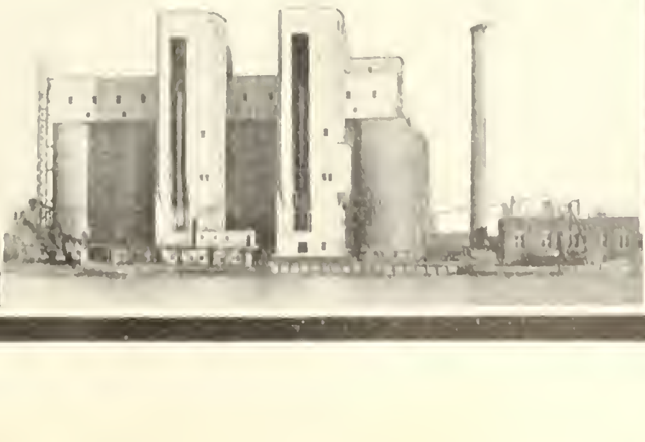

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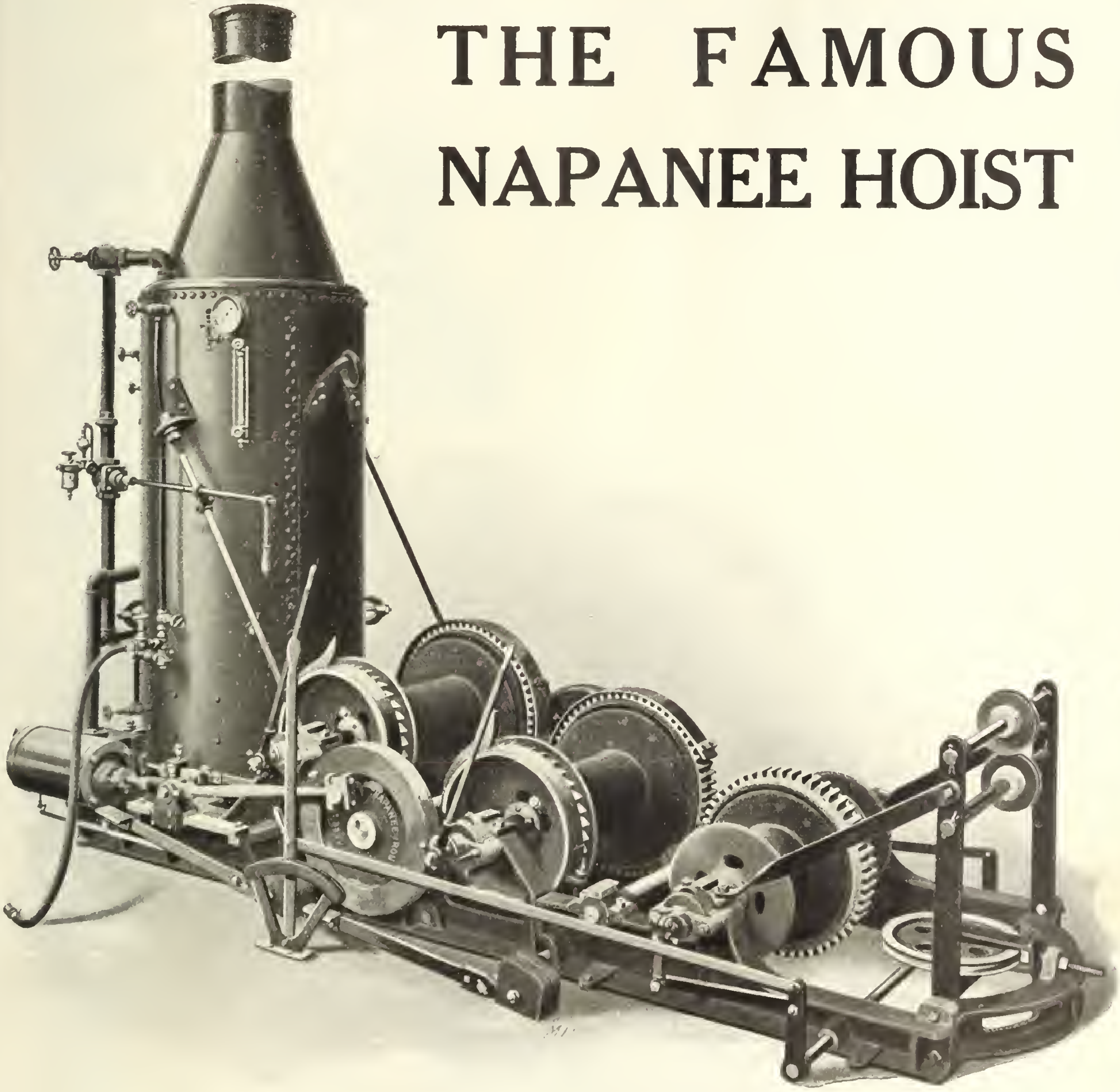

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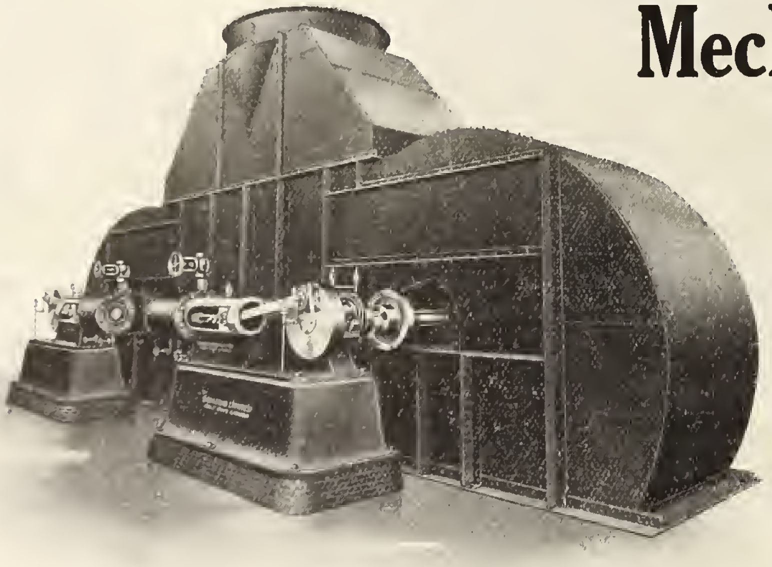

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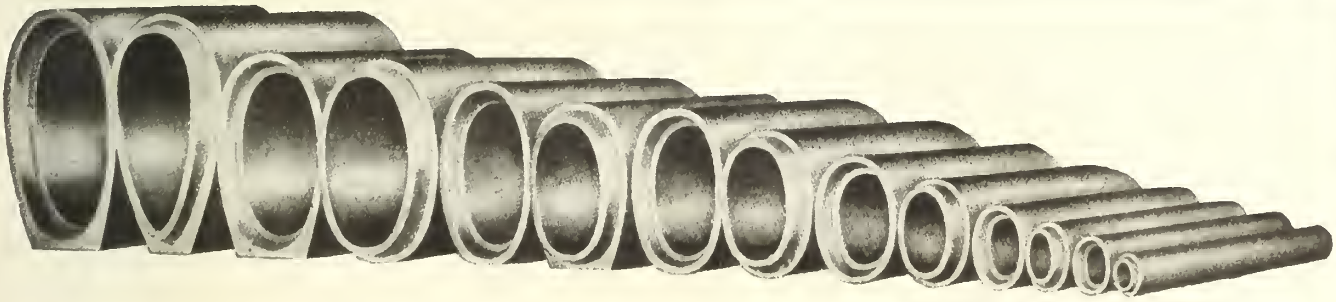

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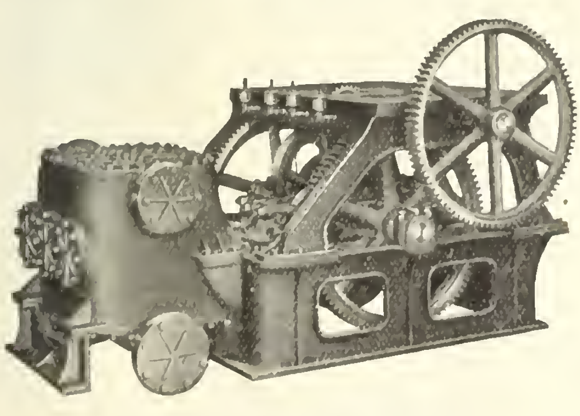

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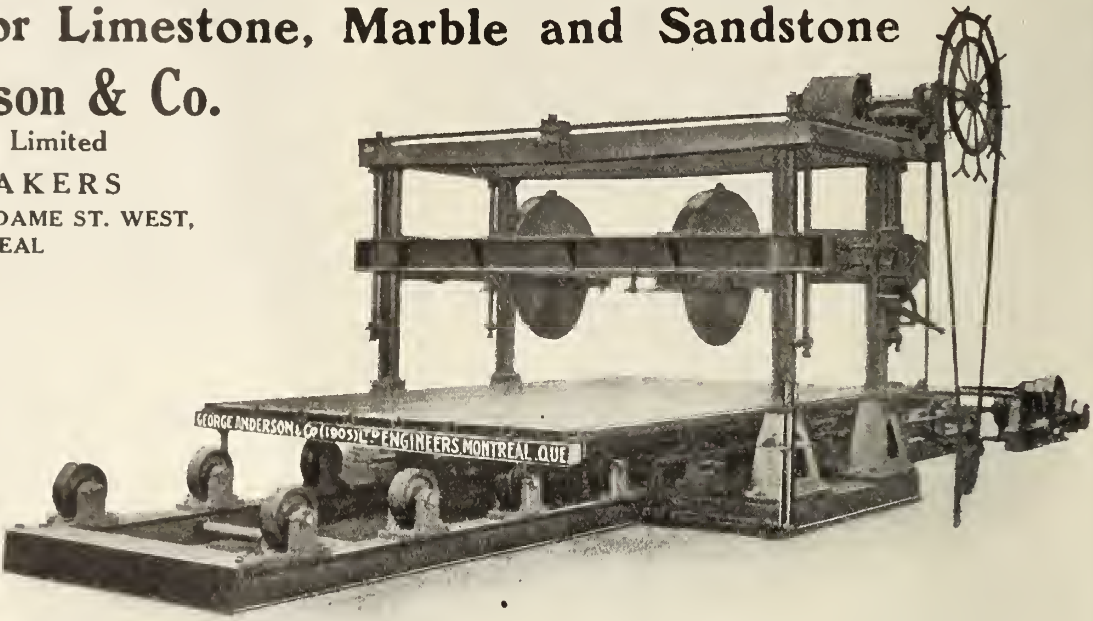

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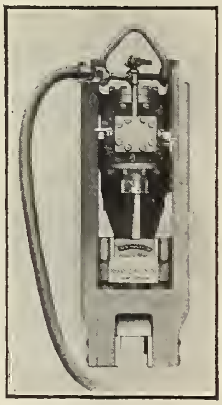

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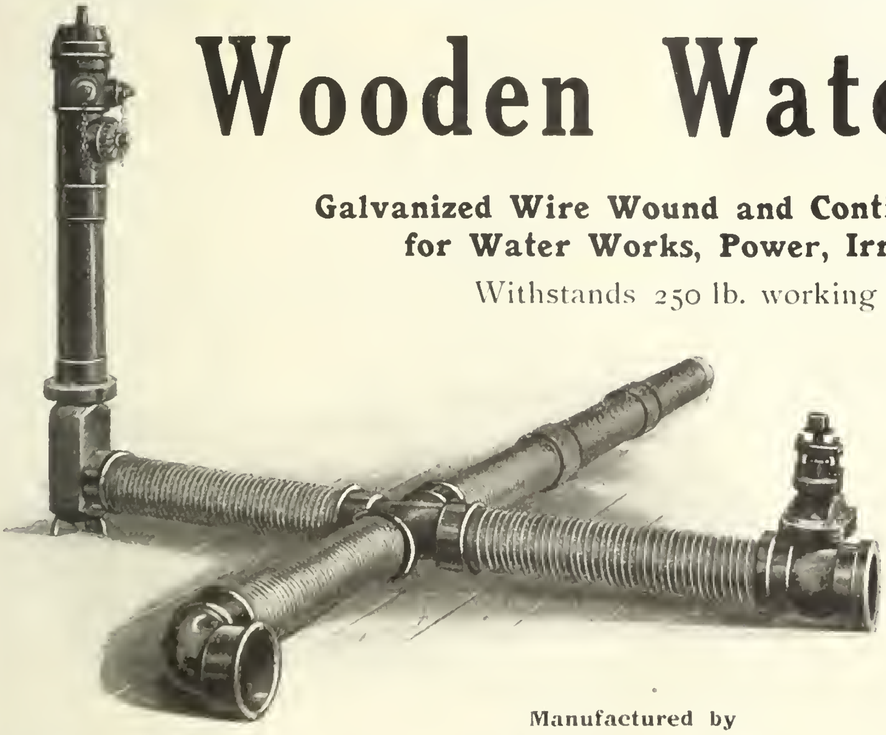

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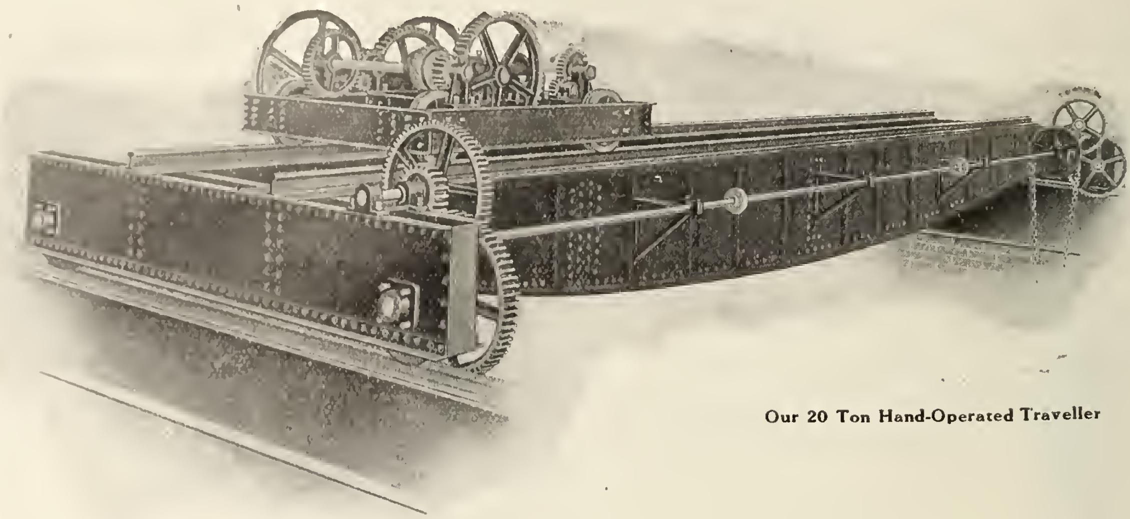

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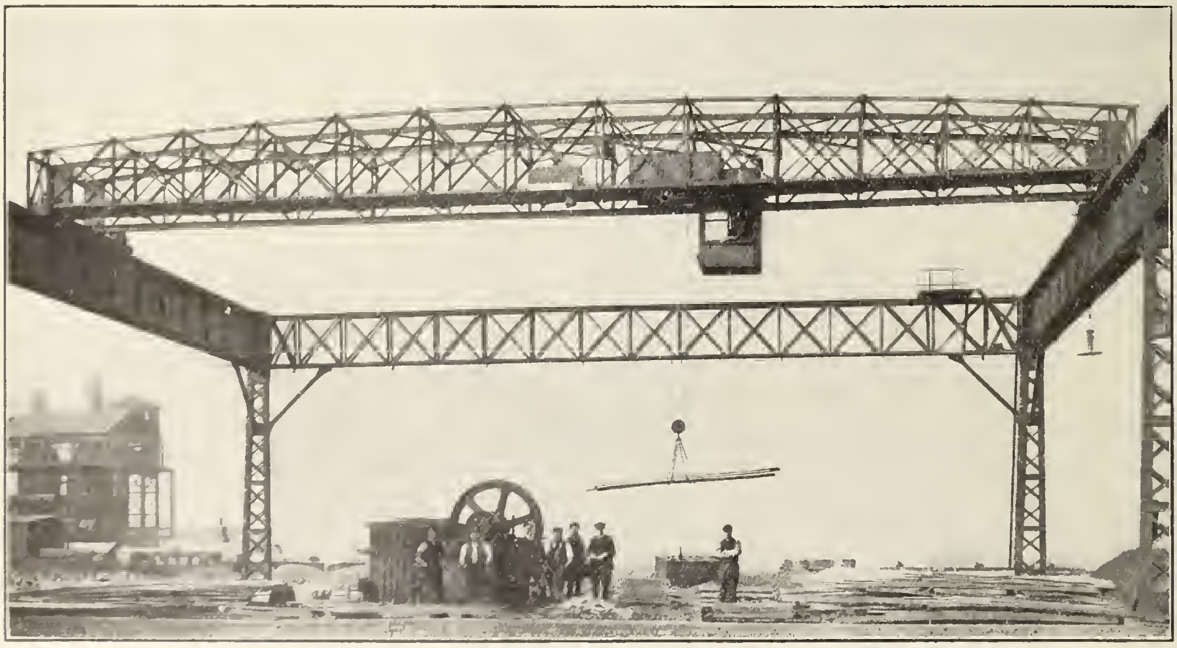

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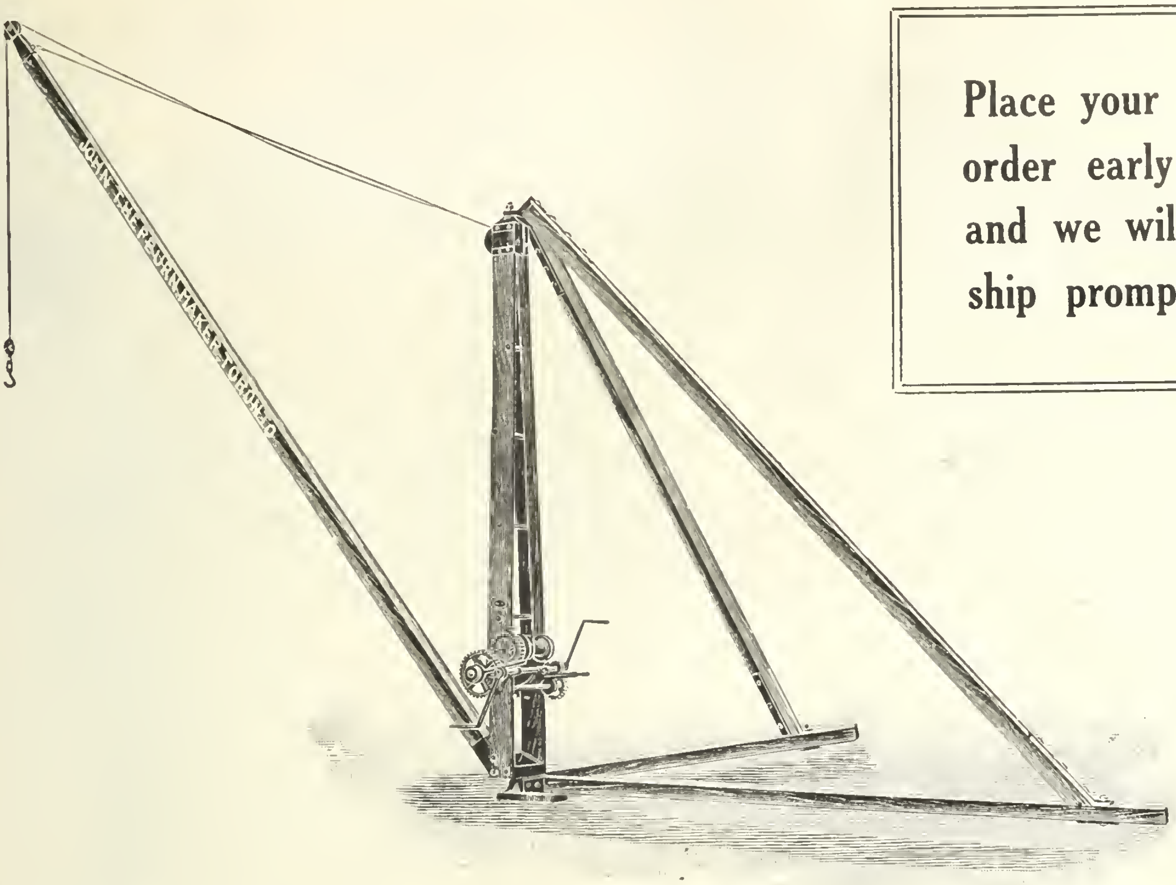
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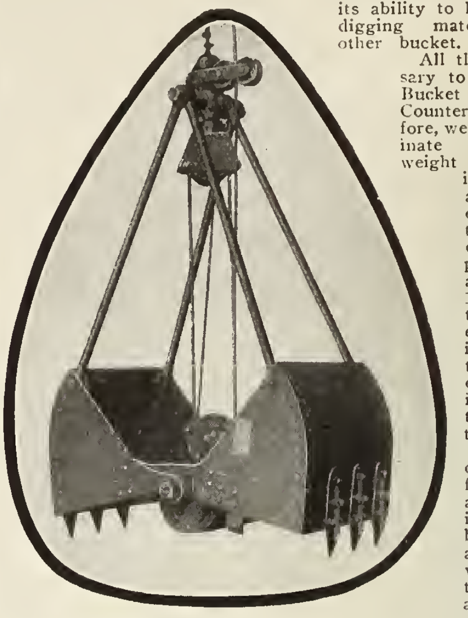
Succeeds Where Others Fail



Because of its scientific construction, it has demonstrated its ability to handle more hard digging material than any other bucket.

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Will not tip over; and therefore especially adapted for working under water because of their ability to dig when resting on the material at an angle.

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Construction under a

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Insures your building not only against the ravages of heat, cold and water but is a fire resister.

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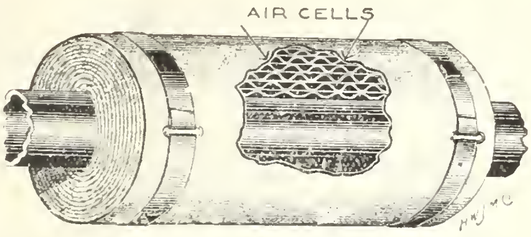
Improperly Covered Steam Pipes Cause Fires!



J-M ASBESTOCEL

The following, which appeared in a leading engineering magazine, shows the importance of covering steam and hot water pipes with fireproof covering, to prevent them setting fire to building:

> "If the contact of wood with a heated surface is continued sufficiently long, the temperature of a few degrees only above the boiling point of water is enough to produce a semi-carbonized film on the wood, which will start smoldering at a very low temperature. The heat arising from an oil or gas flame some distance away is sufficient to start the smoldering combustion. The temperature of a steam or hot water pipe has often been fouud sufficient to cause ignition, due probably to the long continued heat generating certain hydro-carbons of low ignition point, which remains occluded in the pores of the semi-charred wood and are brought into close contact with the occluded oxygen. In fact a constant draught, or even a sudden rush of air, coming in contact with highly carbonized wood is sufficient to cause serious conflagration."

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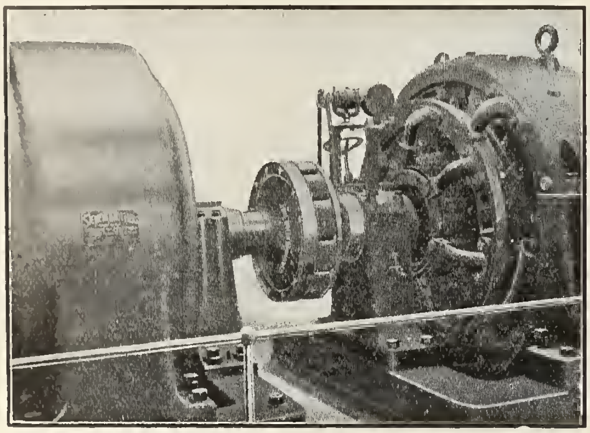

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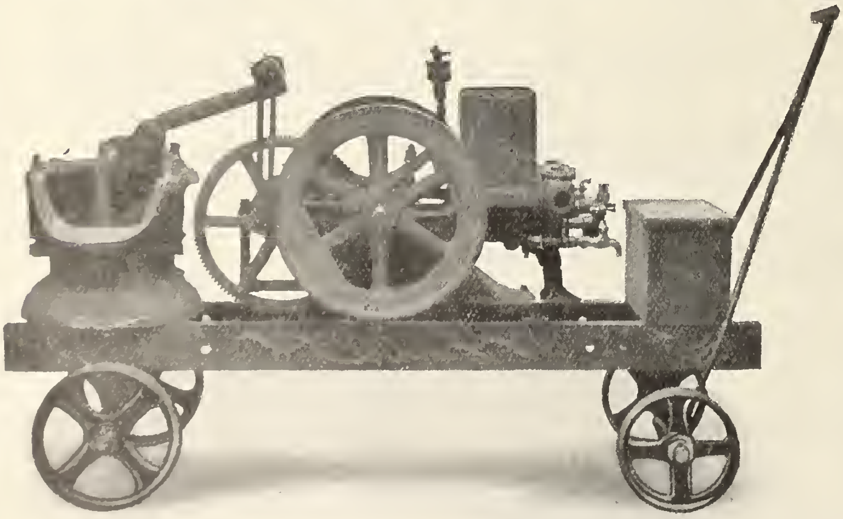
SAVE MONEY by using THE "DOMESTIC" DIAPHRAGM PUMP

3″ Suction



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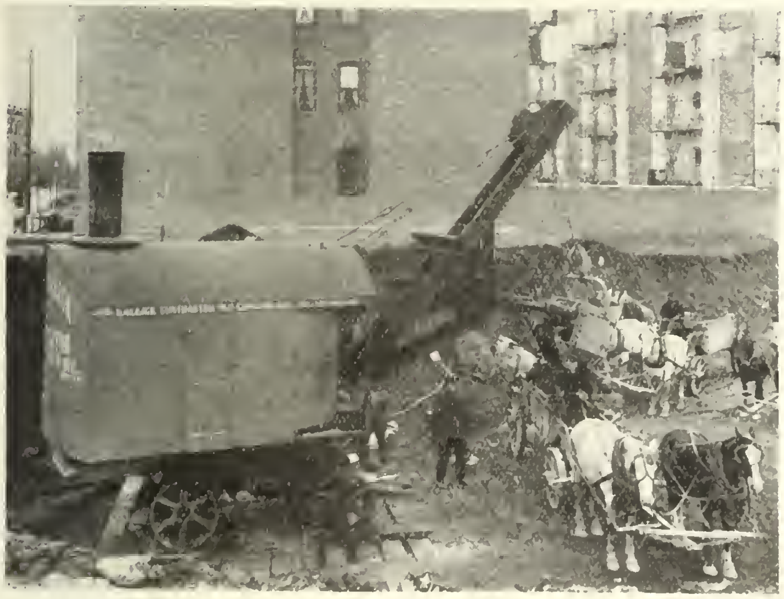

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The contractor with men and teams cannot compete successfully with the man who owns a THEW SHOVEL.

THE REASON WHY

The smallest Thew does the work of from twenty to forty men at one-third of the cost. The Thew, being able to load a wagon a minute, will often save enough in team time to pay its entire operating cost, which means that you are loading dirt for practically nothing. Hand labor is difficult to secure, hard to hold and inefficient in practice, while the Thew is always on the job.

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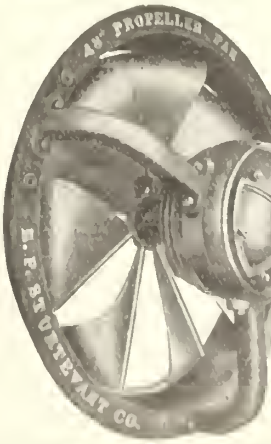

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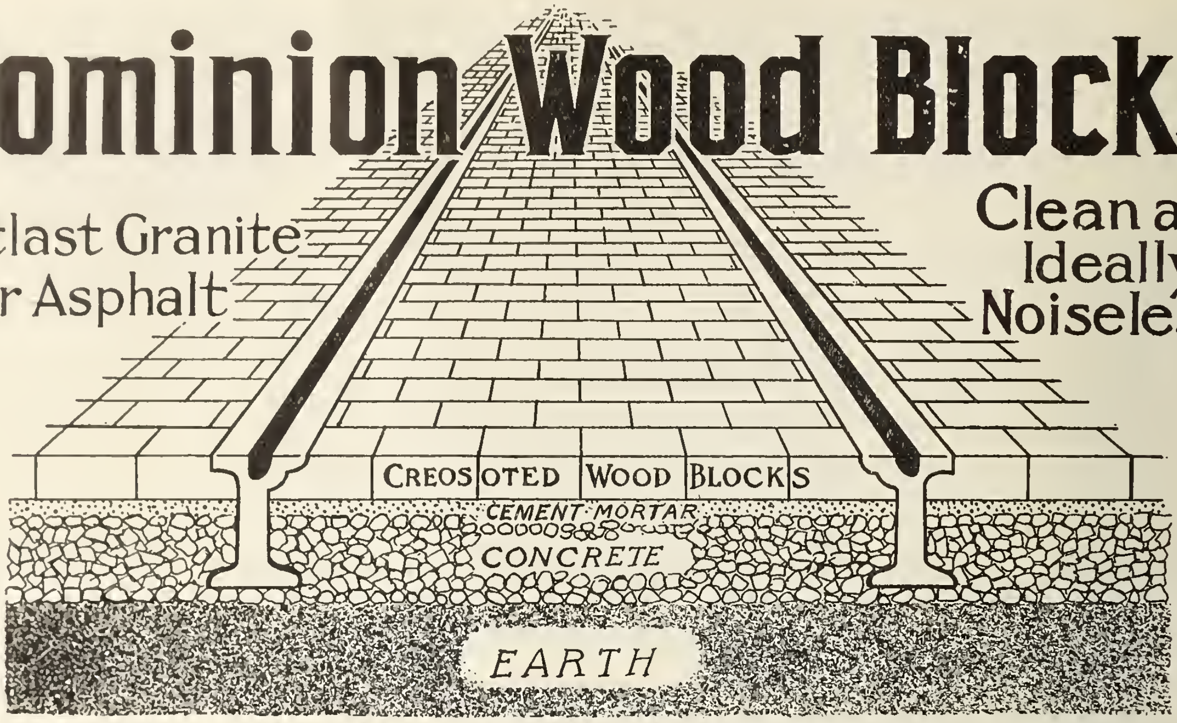

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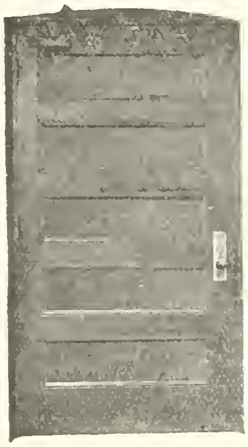

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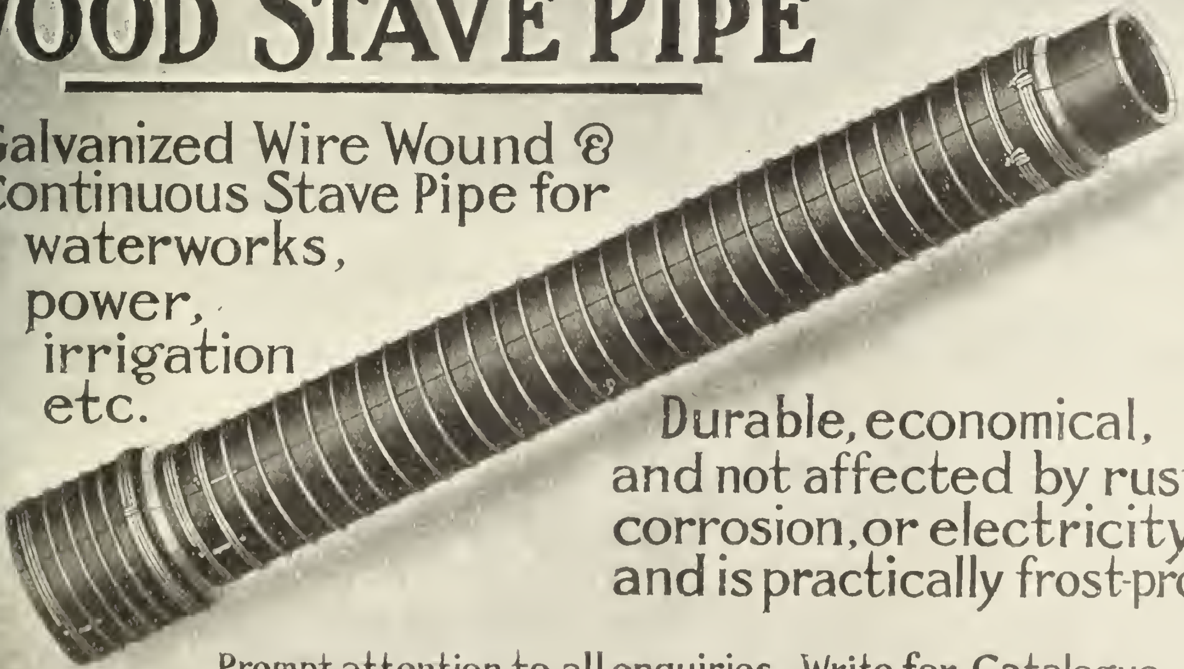

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Durable, economical, and not affected by rust, corrosion, or electricity, and is practically frost-proof.

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An investigation will prove worth your while.

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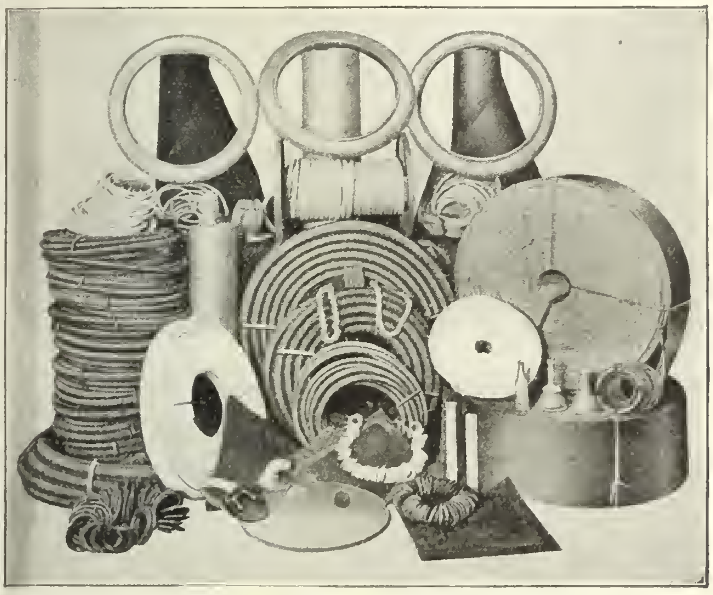

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Most economical because it wears longest.—First, because it doesn't slip. Secondly, because it is made by a process that abolishes **internal friction.** This soon wears the life out of best leather belting and is caused by internal **grinding** as the belt bends and whizzes around small high-speed pulleys.

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We also make other rubber products—Tires, Hose for all purposes, Sheet Rubber Packing, etc. Throughout, you get the same high quality materials, skillful workmanship and years of experience that have built such famous service into products of the Goodyear Tire & Rubber Co., Akron, Ohio, U. S. A. Our Sales of the last four months 50 per cent. greater than those of last year. Write us at once.

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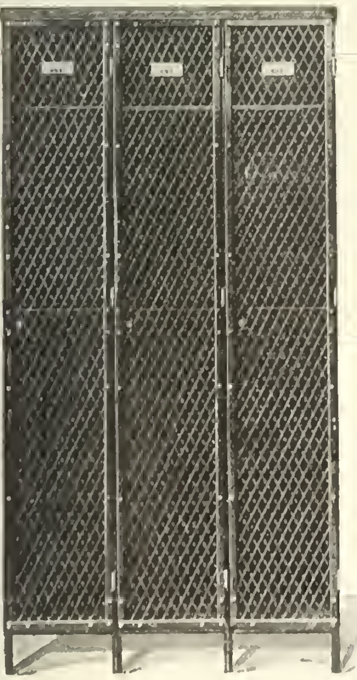

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If you appreciate good value and rigid construction in a locker, you will use MEADOWS' METAL LOCKERS on your next contract.

Send for our interesting booklet entitled

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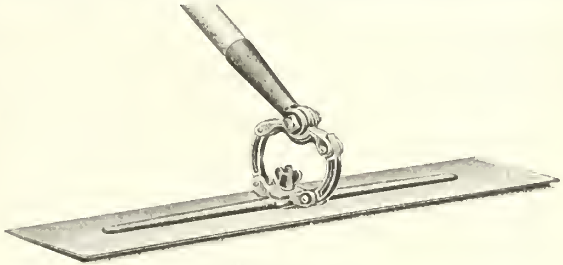
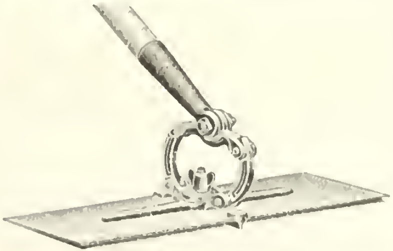


21" Abram Trowel



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Suppose your finisher had an arm eight feet long and was useing a trowel 24 inches long. How much more walk could he finish?

That's just how much we increase his capacity for finishing sidewalks by putting in his hands a set of "Abram" Sidewalk Finishing Tools.

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Alphabetical Index of Advertisers
Page 16

Vol. 26 **October 2, 1912** **No. 40**

The Constructional Development of Canadian Cities

In this issue there is inaugurated with the Federal Capital a special series of articles relating to the history, development and possibilities of our Canadian cities, with special reference to the engineering and constructional field. It is hoped that the series will have an educational value and that our own people, as well as those of Great Britain and the United States, will find our information profitable and, may we add, in cases, suggestive. In each case we propose to say something about the development of the city from the very beginning, to outline the growth of the city from the time when it was but a settlement and to provide interesting facts concerning the growth of population and leading industries, giving in the main body of the article a description of current engineering work and constructional undertakings.

With all our pride of Dominion and pride of Empire we are still too scantily informed, too little appreciative of the resources of the Dominion. One encounters ignorance not only in Great Britain and the United States but in our very midst. This is attributable largely to the fact that Canada is a country of great distances. But it must be remembered that the actual distances between Canadian cities can never be reduced, despite the achievements of modern science and the greater things that we may confidently expect in the future. So that we must keep ourselves well informed and study the development of our country if we are to keep pace with its wonderful progress.

It was these reflections that induced us to undertake the preparation of the present series. We hope that in the publication thereof we shall attain to something of an educational achievement and that with the last of the articles we ourselves shall know more of Canada and more of the development and possibilities of her cities.

The records of Toronto, Winnipeg and other cities are only the beginning of greater things and no man can keep in touch with such development unless he make a study of it and avail himself of every possible source of information. We are confident that in the main the series will be well received for the reason that this journal caters to a class, a vital part of whose business it is to "keep posted."

Rudyard Kipling visited Winnipeg and returned to that city within a few years to find that he was unable to recognize it in any one particular. He found the dreams of a decade before translated into massive and enduring structures of brick and stone. He found Winnipeg established as the great pivotal city of the Dominion. Such a revelation came to Kipling as a matter of wonder and pleasure. With us it is different: there were extenuating circumstances in the case of Kipling which minimize his offence, but none can be urged in defence of Canadian ignorance of Canada.

The series will be continued at regular intervals with articles on the leading cities of the Dominion. Supplementary information will be received gladly and we shall be particularly pleased to have interesting data bearing upon important undertakings projected and under way.

Contract Reform

Designating Tenders by the Letters a, b, c, etc., in the Consideration of Estimates

Whether or not the general quality of construction is affected adversely by the principle of the lowest bid, was the subject of an editorial published in our issue of June 12 last. Some further light is thrown upon this subject by the experiences of a large contracting concern of which we have heard recently. The company had been negotiating with a certain city for the erection of a large structure and had submitted a careful and reasonable estimate. The City Engineer recommended the acceptance of the firm's tender, but just about this time the city received a proposition from the agent of a reinforced concrete concern who happened to be in the city and who, hearing of the work, hunted up some of the city officials and offered to build them a reinforced concrete building at such a low figure that the committee in charge of the work postponed matters and eventually awarded him the contract on the understanding that he would provide a steel roof with steel columns to support the same and that the structure itself with the supporting columns should be of reinforced concrete. The committee came to this arrangement in spite of the opposition of the City Engineer who warned them that the work could not be carried out for the money. The work was started, but before the completion of the first storey the contract was thrown up, the city was left to pay the wages and the people who furnished the material were left in the hole. Seeing that the city authorities were warned by their engineer that the work could not be carried out at the contract price, we fail to see how they are justified in refusing to pay for the material supplied.

Certainly, arguments unfavorable to the principle of the lowest bid are not difficult to find. Most of us have heard of men of little experience and resources managing to obtain contracts owing to their command of a little influence in responsible quarters. Take the case of highway bridges. There are at least a score of small concerns in the province of Ontario attempting to build bridges and in cases they have absolutely no machinery whatever. We heard recently of a wagon maker who obtained a contract for a bridge. He had a brother on the committee and was given the opportunity of amending his figure so as to bring it lower than the lowest bid. He built the bridge, but a few weeks afterwards a drove of cattle went across it and the structure collapsed.

We cite these cases because they have a direct bearing upon one of the most vital considerations in the business. Personally, we cannot believe that any perfect system of awarding contracts can be evolved. Objections may be brought against the established principle of the lowest bid, but many arguments can be adduced in favor of it. Generally it promotes competition and ensures competition between men of experience who are able to figure closely. If it is fair to define an engineer as a man who can make one dollar go as far as any fool can make two go, it may reasonably be asserted that a competent contractor can obtain far more economical and satisfactory results than an incompetent one or a man of limited experience in the particular class of work under consideration. And then, the low tender undoubtedly prevents a certain amount of crooked work. We do not say that it has eliminated corrupt practices—a certain amount of corruption will always obtain under any system—but it has made crookedness and favoritism rather more complicated of execution. So that there are both pros and cons to be considered in the matter of the lowest bid.

These observations serve to introduce a suggestion that we received recently from a prominent contractor who held the opinion that the "best" bid should be accepted. The "best" bid he defined as that which "came the nearest to fulfilling all the conditions" and which was submitted by an individual or concern whose record in the contracting field would bear close investigation. The further suggestion given us, and one which we think worthy of some consideration, is that tenders should be presented to the committee under designating letters; the first under (a), the second under (b), and so on. Each tender might be read carefully to the committee without giving either the name or the price. The decision might then be made as to which was the best, at the same time making a second or even a third selection. Afterwards the price might be considered and finally the names of the tenderers announced. Then might follow the final selection.

The gentleman who gave us this suggestion has had wide experience in the contracting field and he expressed himself confident that if some procedure of the kind were adopted much of the trouble obtaining under the present system would be eliminated.

The whole subject is one worthy of careful and extended discussion on the part of our readers. Certainly no reforms can ever be brought about unless the contracting community interest itself both collectively and individually in matters of this kind, and the only way in which the feeling of the trade can be effectively obtained is by discussion. The trouble is that there is apathy among Canadian contractors. Most of them are content with the share of the work they are getting and will not bestir themselves in matters affecting the common weal. Why should not Canada have a "general municipal law" such as is now proposed for the United States by the American Society of Engineering-Contractors? The consideration of such matters is indicative of progress and unity. Moreover, a careful study of this procedure enlightens and informs a contractor and provides him with a ready fund of suggestions if called upon at any time for advice.

FREE engineering is rightly contended to be one of the abuses in the contracting world. There are hundreds of first-class architects and consulting engineers capable of preparing plans and specifications for any structure and there seems to be no valid reason why any government, municipality or other body should write to, say, half a dozen bridge concerns and ask them to prepare and submit plans for a work under consideration. It would seem that the proper procedure would be for them to obtain their plans and then submit the information to the structural companies and ask for bids. Where a dozen sets of plans are prepared, as at present, only one set should be prepared and that would be at one-twelfth of the cost, and should devolve upon the proprietor. The preparation of a set of plans by each individual contractor involves waste of time and expense which in the sum total is formidable and for which there is no justification.

* * *

THE water-power resources of British Columbia are being investigated by the Commission of Conservation and the resulting information is to be published, as soon as it can be made available, in a report to be entitled "The Water-Powers of Western Canada," which the Commission have in course of preparation. To-day, if one views a map of British Columbia and asks what are the power possibilities of the interior of the province, no person can inform one. After the Commission has completed its present reconnaisance survey, it will be possible to form some reliable conception of the water-powers of British Columbia south of the line of the Grand Trunk Pacific. Later on, the country north of the new transcontinental line will be canvassed for information respecting its water-powers. It is pioneer work and, so to speak, blazes the trail for the capitalist and the engineer.

* * *

IT is interesting to find that the actual mileage of the Canadian Pacific Railway system has increased since 1901 from 8,358 to 12,548. This mileage includes that under construction, that of other lines worked, and that of the C.P.R. system proper. During the last five years the annual expenditure on additions and improvements to the system has averaged approximately $20,000,000, exclusive of expenditure in the form of rolling stock.

* * *

ONTARIO'S industrial expansion is strikingly shown in the annual report for 1911 of the Provincial Secretary and Registrar. During the twelve months 825 companies came into existence, while licenses to do business in the province were granted to 125 companies incorporated outside Ontario. Most of the licenses were issued to companies incorporated under the Federal Act, but a large number represented the appearance of British and United States enterprises. Eighty-nine older companies found it necessary to apply for authority to raise additional capital to take care of the demand for their output.

The Supply Market

(Toronto Staff Article)

THERE is a good demand for all building materials and business is particularly brisk. The wet weather has delayed building operations somewhat, but prospects are bright for steady business until the frost sets in.

The question of freight transportation is becoming a more serious one every day. From all quarters complaints are heard as to the shortage of cars and many works are practically at a standstill through their inability to get materials. The railway companies are endeavoring to remedy this state of affairs by circularizing their customers, asking them to unload cars as speedily as possible. Not only is there a shortage of cars, however, but also a lack of motive power, cars sometimes standing on the tracks for days without engines to move them. At this season of the year the transportation question is always a problem on account of the movement of grain and produce, but this year the shortage of cars has been felt earlier than usual; morever, it is more acute.

On account of this car shortage, the present demand for crushed stone and gravel is greater than the supply. Orders for sand are steady and particularly heavy.

No changes have taken place in steel quotations although the market is somewhat uncertain.

Lumber dealers report good business with builders and there seems to be no prospect of a drop in prices for some considerable time.

Can Anything be "Good in Theory" but "Bad in Practice"?

TO the scientific man who uses words with precision there is no little irritation in the popular expression, "It is good in theory but bad in practice," says Engineering & Contracting. The test of the truth of any theory is its application. If there is failure of the theory in practice, then the theory certainly lacks perfection, if, indeed, it be not wholly bad. An idea, therefore, cannot be theoretically sound and at the same time practically rotten.

A theory is a generalization that purports to give a correct explanation of a phenomenon. In so far as it falls short of correctness of explanation, it is not a true theory, and deductions premised thereon will lead to conclusions more or less wide of the mark.

As a consequence of the fact that so many theories are imperfect generalizations, we have another common expression that connotes contempt for theory, namely, "Too much theory and too little experience."

There can never be too much theory, where theories are complete and correct. Experience itself is of use mainly because it enables its possessor to theorize and to apply theories with a greater degree of accuracy.

Another frequently heard expression is first cousin to the two above given: "He is just a theorist." If one were really "just a theorist" and a just theorist, his reasoning should nearly always be correct. Isaac Newton was such a theorist.

Agriculture, until very recent years, has been an art devoid of theories, and most of those that were current were counterfeit. Agriculturists are now evolving correct theories, and in so doing agriculture is becoming a science. The agricultural engineer is a possibility only because there are correct theories relating to the operations of farming.

Engineers will perform a useful service for mankind by championing the word theory whenever they hear it used in a disparaging way. Contempt for theory is not only an evidence of ignorance but it is, in reality, contempt for science, for a science is essentially a group of theories relating to allied phenomena.

Sand Foundations for High Buildings

SAND, being almost incompressible under ordinary conditions, can sustain very heavy loads with slight or negligible compression. When it directly overlays rock or other thick hard stratum and is securely confined or otherwise protected against possibility of lateral displacement it forms a satisfactory foundation and will carry heavy loads with safety as long as these conditions are maintained, says the Engineering Record.

It transmits pressure laterally so that a heavy vertical load may produce considerable horizontal thrust and to resist it the sand must be confined horizontally by natural or artificial means. At considerable depths below the surface the weight of the superincumbent material affords resistance to transverse or upward pressure and is equivalent to lateral confinement for ordinary pressures. This resistance, of course, ceases whenever an excavation is made below and adjacent to the point of application of vertical pressure.

The presence of water makes a great difference in the character of the sand so that the drainage of wet sand or the saturation of dry sand under pressure is an important matter, while flowing water passing through sand, especially if fine, is very likely to carry the grains with it or produce a considerable movement.

Careful consideration must therefore be given to these factors when it is proposed to build heavy structures on sand foundations. If any changes in the amount of water in the sand are possible adequate safeguards to maintain the conditions must be adopted.

Many heavy buildings of moderate height, including some of the earlier steel cage sky-scrapers, have foundations on sand, usually only a few feet below the surface, and these foundations in many instances have proved entirely reliable. Almost all of them are at or above ground water level. Formerly they were made with timber and masonry footings, then of concrete and now almost entirely of reinforced concrete or of steel beams enclosed in concrete.

Some buildings have a monolithic foundation slab covering the entire area. While theoretically this distributes the load uniformly and produces the smallest unit pressure, it is generally very difficult and expensive to avoid excessive stresses in the distribution, and some such footings, especially those of concrete without adequate reinforcement, have become badly cracked and broken and have permitted serious settlement. It is therefore the general practice now to support the columns singly or in small groups on isolated separate footings proportioned to reduce the loads to substantially the same unit pressure on all.

The Spreckles Building, San Francisco, 15 storeys high, was built about fifteen years ago with all of its columns seated on a double grillage of continuous I-beams reaching entirely across the lot in both directions and embedded in a mass of concrete more than 4½ ft. thick resting on wet sand 25 ft. below the surface of the street. This has proved satisfactory, enduring severe earthquake shocks which it was expected to resist.

The columns of the St. Paul Building, a 26-storey structure in New York, have steel beam and girder grillages with concrete footings on the wet sand about 30 ft. below the street. The sand was loaded to 8000 lb. per square foot and in several years has settled only a fraction of an inch and with such regularity that it has been unnecessary to adopt the special provisions designed for compensating irregular or excessive settlement.

In the new Municipal Building, New York, part of the foundations are carried to solid rock and part supported on wet sand, nearly 90 ft. below the surface. This building is 25 storeys high and has a 15-storey central tower rising to a height of 580 ft. above the street. The pressure on the sand is 12,000 lb. per sq. foot, and this pressure was adopted after making preliminary and full-size pier tests which showed settlements of less than 3/16 in. and ½ in., respectively, under the working load. A large proportion of the ultimate load has now been applied and the sand foundations show slight settlement, not exceeding the amounts indicated by the tests. The rock foundations show settlements of about ⅛ in., attributed to adjustment of bearings. The settlements in both cases are so small that no injury to the superstructure is anticipated.

The foundations of the 32-storey building in Cincinnati consist of steel grillages enclosed in concrete and imposing a load of 11,000 lb. per square foot on dry sand about 50 ft. below the street. In this case the foundations carry an estimated total load of about 104,000,000 lb. and occupy about 70 per cent. of the entire area of the building. No allowance whatever has been made for settlement, but it is expected that the full load may cause a packing of from ¼ in. to possibly ½ in.

The comparison of these foundations of sand with those carried through quicksand to deep rock is difficult, but it seems that the large saving effected by the former justified the very careful consideration of both types and a study of rational and practicable methods of protecting the sand. So far reliance appears to have largely been placed on carrying the footings to a considerable depth rather than enclosing them with some protecting barrier that might in some cases prove simple and economical.

Solidifying concrete castings by subjecting the forms, containing the mix, to alternate vertical and horizontal oscillations, has been successfully accomplished on recent work in India, according to Mr. E. Bruce Hall, of the Shanghai Society of Architects and Engineers. Cast-iron forms are used for this work and provision is made for securely placing such reinforcement as may be desired within them. The amplitude of the oscillation is small, but the speed is high and the motion causes the cement and fine particles to fill up the voids between the coarser portions of the aggregate, thereby securing a compact and homogeneous mass. It is stated that very satisfactory results have been obtained by using this method in the manufacture of cement pipe.

May Concrete be Injured by the Action of Electric Current?

IN the Contract Record of September 18 there was published on page 44 the extract of a paper on Electrolytic Action on Unreinforced Concrete, prepared by Mr. C. de Wyrall, Chief Inspector of the Interborough Rapid Transit Company, of New York, for presentation at the recent congress of the Internation Association for Testing Materials. It is interesting to learn that although this paper was made public by being printed and distributed to the membership of the congress it was ultimately withdrawn by the author and so will not appear in the official proceedings. Commenting editorially upon this phase of the matter the Engineering News, of New York City, denounces the attempted suppression as most unwise. Our contemporary says:

"Engineers want to know and are entitled to know all the facts about concrete. Vague rumors of trouble travel farther and faster and do far more injury than definite knowledge. Concrete is going to be used more and more anyway, and the more knowledge engineers have as to its properties, the more certainty they will have of being able to use it successfully.

"And having said this, it is proper to say also that Mr. de Wyrall's brief paper is not by any means to be taken as conclusive. He makes the sweeping generalization that:

> 'The combination of electric current and water seems to act as a distintegrating agent on the cement, destroying its cohesion and reducing it to a paste which, when dried, can be pulverized with the fingers.'

"There is to be set against this, the results of many experiments to find any action of electric currents on mass concrete, all of which have shown negative results so far.

"Before it can be concluded that the disintegration recorded by Mr. de Wyrall was due to electric action, it must be established much more definitely that no other possible causes of disintegration existed. It is, in fact, stated by Mr. de Wyrall that salt water was present in the case of the two walls reported as suffering injury. There may have been alternate wetness and dryness, or there may have been some foreign material in the concrete which acted in conjunction with the electric current to cause injury, or other causes may have operated.

"Experiments upon the effect of electric currents on concrete have appeared to show a forcing of dissolved chlorides into the mass of concrete test pieces. While no injury has resulted as yet, it is not certain what might result were the action long enough continued.

"It would seem, therefore, that the Scotch verdict 'not proven' must be rendered upon the indictment brought by Mr. de Wyrall. There is no need for engineers to be alarmed concerning concrete structures, nor is there need for the cement and concrete interests to be alarmed concerning the influence of his disclosures. Concrete is far too valuable and useful a material, and its reputation is too well established for one or a dozen instances of failure to shake our confidence in its reliability. The sensible thing to do is to set to work to find why these occasional failures do occur; and let us not be over hasty in jumping at conclusions."

The Man Behind the Gun

An Economic Consideration of the Operations of the Laborer

By Charles E. White, Jr.

IN a country house of masonry, well built, the architect had specified all exterior foundation walls to be plastered smooth on the outside and then waterproofed by a double coating of waterproofing compound. The new building stood in an exposed location on the side of a lake, where digging down a few feet below the surface of the ground water was disclosed, especially in the wet seasons of early spring and late fall. Probably this was the reason the architect took such pains to protect the foundation walls from dampness. However this may be, it is certain that waterproofing was called for, the best possible brand of compound, applied carefully to accomplish the most perfect results. The architect specified it, presumably the contractor figured upon it and most certainly the owner was entitled to it.

Fig. 1—The man who may cause the contractor profit or loss.

This job was one of those where supervision was infrequent. That is, in the owner's contract with his architect supervision was to be from time to time, at an agreed-upon price for each visit. Instead of having full supervision the owner decided that, as his house was not a large one, he could get along with periodical supervision, an arrangement particularly practical on this job, for the contractor was well known—a thoroughly reliable man.

Nevertheless, when the architect made his first inspection after the foundation had been completed he found that the water-proofing extended only a little below grade instead of continuing to the bottom of the wall as specified. The masonry appeared to be all right, but noticing one place where the waterproofing seemed thin, the architect caused some of the earth in front to be shoveled away, exposing the incomplete waterproofing which extended but a few inches below the surface of the ground.

Architect and owner were surprised and considerably disturbed over the result of the investigation. The contractor himself was filled with chagrin. "I didn't know they stopped that waterproofing at grade," he protested, indignantly, "who told them to do that," and he glared at his foreman, who stood nearby, trembling in his boots. Further investigation disclosed the fact that the foreman didn't know about it, either. Busy on another job he had paid very little attention to the work under discussion. One of the men had been told to waterproof the wall and he supposed it had been done correctly.

Then the man who did the work was called to account and it developed that on the particular side of the wall where the waterproofing stopped at grade (for nearly all the balance of the wall was properly waterproofed) the trenches had become filled with loose dirt, caved in from the bank. Rather than go to the labor of digging it out again (considerable work on a hot day) the workman had simply applied the compound down to grade, after which with his

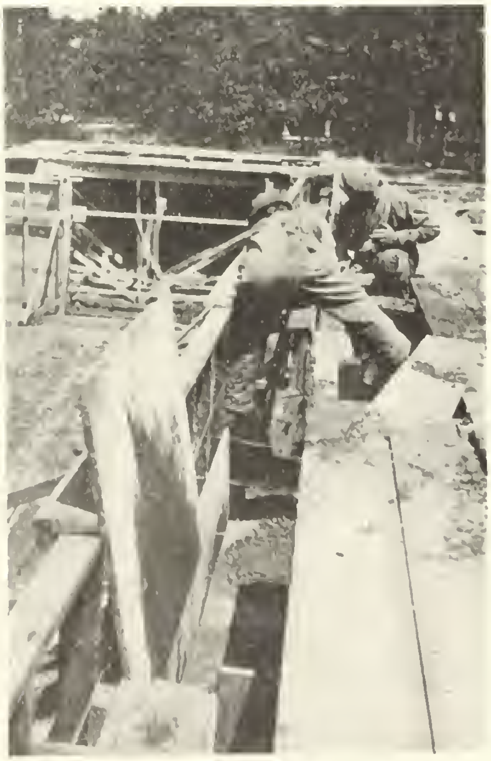


Fig. 2 Inefficient handling of concrete

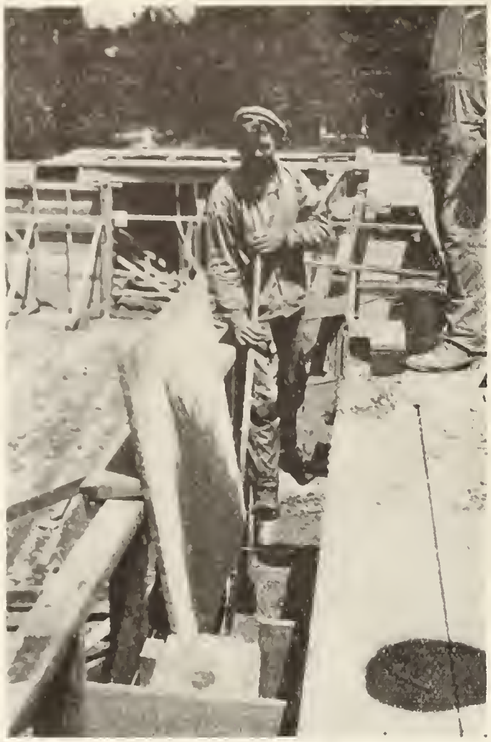


Fig. 3—The addition of a concrete spader quickened this job and facilitated the work for the men.

foot he caved some more dirt into the trench to hide evidence of the dividing line between waterproofing and lack of waterproofing.

Incidents like this happen oftener than many contractors realize. Intending to do good work for their customers, most builders are very much annoyed when they find their intentions thwarted by the carelessness of employees. Much of the criticism under which contractors labor is occasioned by the lack of interest of workmen, though bad work is often in no sense the fault of the contractor himself.

Men who have had the handling of other men know without being told that one of the greatest difficulties with which to contend in contracting is the disposition of some workmen to slight work. A few years ago, when competition was not so keen, the average mechanic took considerable interest in his work. He took pride in a good job instead of (as so many do to-day) trying to accomplish work with as little effort as possible, regardless of permanency.

To do justice to skilled mechanics it is only fair to say that often the contractor does not give them time to do work properly. Some foremen, ordered to do so by their bosses, drive men so hard there is no time to do good work. Careless work under these circumstances may well be expected. Keen competition has brought about quick methods of doing work, though often at the expense of quality.

On the other hand, to do justice all around it should be remembered that poor work on the part of men cannot always be laid at the door of the contractor. Most builders are honest. They are anxious to do a good job and their orders to employees are: "Do good work and good work only." But no builder can observe every part of the work at every stage. When his back is turned a careless or indifferent workman may slip in something not up to standard and the contractor is just as unaware of it as the architect.

One contractor who makes a specialty of masonry houses has found that the only way to secure good work at all times is to employ carefully selected men of known reliability. In order to inform himself as to the status of any new men he hires there is required from each a reference from a former employer. This reference is very rigidly considered. Instead of merely filing the name of the former employer without investigation, as so many contractors would do, this builder makes a personal investigation to find out the man's past record. He inquires about his habits; he ascertains his methods of working, his speed and accuracy, as well as general tendencies. All the information obtained is entered on a card under the man's name, where it can be quickly referred to at all times.

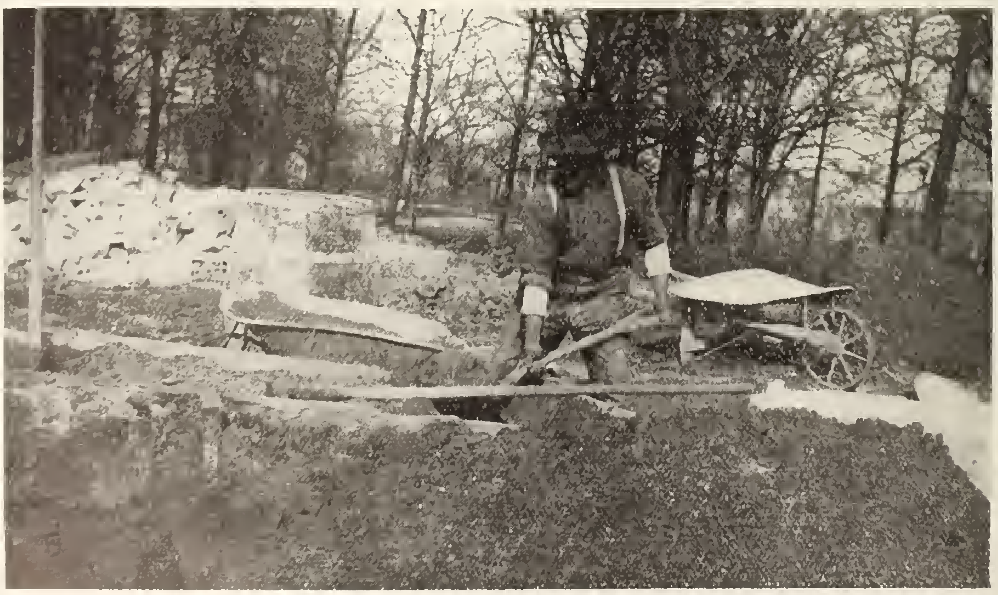


Fig. 4—The man who mixes the mortar is worth watching: he may hasten or retard the work.

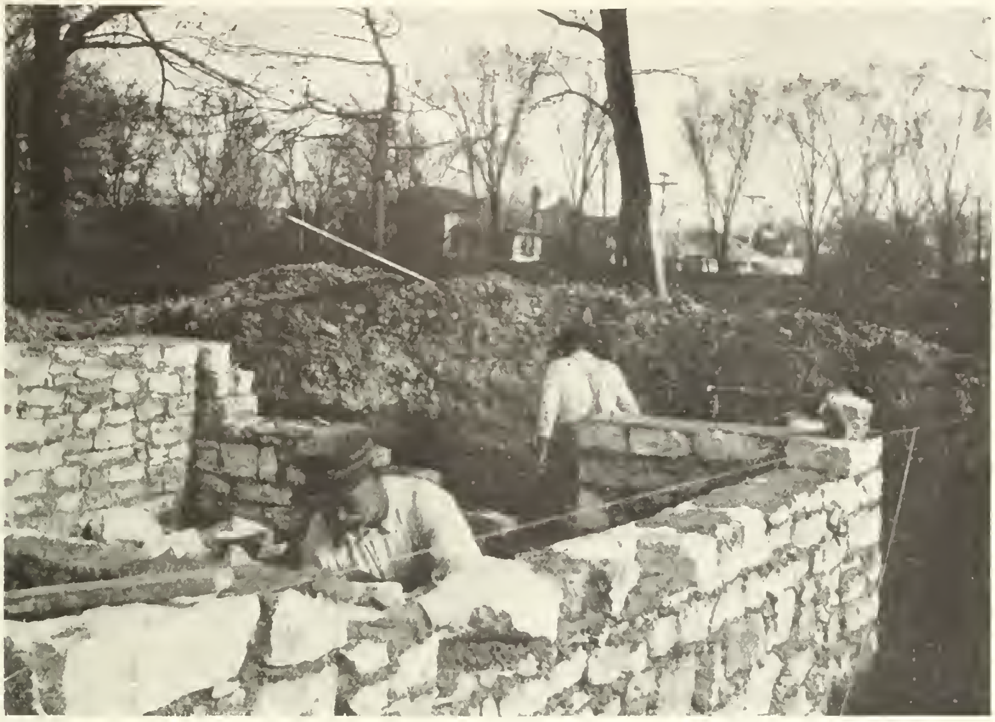


Fig. 5—The mason in the foreground was more efficient than the other because served by a more intelligent laborer.

Contractors should realize that the ultimate success of a job may depend upon the laborers who draw the lowest wages. The men who appear to be of least importance may be the very ones who, neglecting some little points, eventually annoy architect and owner, bringing about the ultimate loss of the contractor's reputation. Every man who pushes a wheelbarrow (Fig. 1) should be as carefully selected as the highest-priced mechanic on the job. He has it in his power to work much harm if he is careless or neglectful.

No matter how able your foreman may be he cannot get high-grade work out of low-grade men. As a matter of fact, the foreman is usually a better judge of men than his boss. He it is who comes into most intimate contact with them. He knows who the slow ones are as well as the quick ones. He can, after a few days' observation, tell who among the new men are up to the right mark—efficient, alert, reliable workmen. For this reason the most successful contractors usually give their foreman considerable latitude in hiring and discharging help, all of which has a good effect on the men themselves, who are inclined to look down upon a foreman who has not the power to discharge them.

Able foremen can do much toward increasing the efficiency of a gang by the way they place their men. Putting three or four slow workers together always results in slowing down the work. Placing several hustlers together frequently speeds work up beyond the point where it will be well done. The most satisfactory way is to mix men up, putting a slow man alongside of a fast one, which seems to increase the efficiency of both.

An illustration of the importance of placing men intelligently, according to their characteristics, is shown in Figs. 2 and 3, actual photographs of an incident the like of which happens on so many jobs. The photographer was ordered to visit any building in process of construction and secure a photograph of "inefficiency." He packed up his kit and jumped on a car, with the idea of alighting at the first new job he came to. To tell the story in his own words, "I hadn't gone more than a block or two," said he, "when the car swung around a corner right near a new house where they were putting in a concrete foundation. I jumped off and sat down on some stones a few minutes to watch the work. A man who appeared to be the foreman was over at the back of the lot, leaning up against a pile of boards, smoking a cigar. At one side of the new foundation I saw three or four laborers mixing a batch of concrete. They worked slowly, frequently stopping to talk,

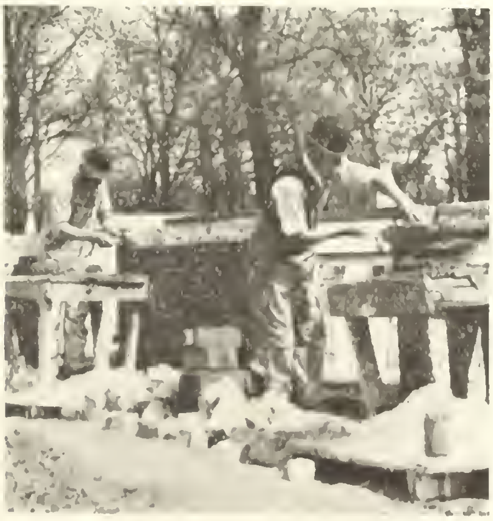


Fig. 6—The amount of work done by these men depends upon the speed with which they are served with material.

while two men with wheelbarrows waited for their loads.

"In the trenches two more men were placed and I saw them wait repeatedly, several minutes at a time, for the concrete which the wheelbarrow men were unable to bring quickly enough, owing to the slow speed with which the mixing was done. A further error was made by the men at the trench trying to ram the concrete in place by means of short pieces of scantling—a back-breaking process not productive of the best results (Fig. 2). A little later the foreman strolled leisurely over to the tool box, picked out a concrete spader, and the work at the trenches went about twice as fast." (Fig. 3.)

Contractors who have never figured the loss in dollars and cents when even trivial waste like that illustrated occurs, are surprised when it is brought to their attention.

A little slow speed from half a dozen men may make a difference of, say, ten cents an hour from each man. This produces a loss of 60 cents an hour from the gang, with a grand total of $4.80 per day or $28.80 per week—quite a respectable sum to be thrown away upon "inefficiency."

Contractors who have made the mistake of giving their entire attention to the efficiency of their skilled mechanics should consider their unskilled laborers, who are really the "men behind the guns." A gang of men is a machine for performing work to make a profit for the contractor. If any wheels in the machine are wrong the entire output of that machine is affected. Slow speed on the part of laborers means slow speed on the part of those skilled mechanics who are served by the laborers. Right at the mortar box is the place to begin with "efficiency engineering" (Fig. 4) for the apparently humble occupation of mortar mixing is quite as important as any other part of the work. On many a job dollars are saved and dollars lost right here.

Skilled mechanics should be kept busy doing the work for which they are skilled. It is the job of the stone mason to put as much stone into the wall in a given time as possible. Every minute he is obliged to hunt for stone he is losing time, and his employer is losing money. Fig. 5 is an interesting photograph, showing the record of two laborers (not visible in the picture). The mason in the foreground was served by a young Swedish helper who, watching the wall as it progressed, selected intelligently from the pile, stones of just about the right size, and delivered them within easy reach. The mason in the background was served by an indifferent laborer—one who was busy all the time, to be sure, but who brought all kinds of stone without careful selection. The picture is a fair representation of what was going on all through the day—one mason raised his wall quickly with least effort, the other was always hunting for stone.

The approximate ideal of efficiency in building operations would be produced by an endless chain bringing material from the storage piles and delivering it at the wall automatically. Such an ideal condition cannot be obtained in the ordinary course of building, because it is impractical on most jobs to have an "endless chain." However, with the intelligent co-operation of laborers at the storage piles and mechanics at the well much can be accomplished. The skilled men at the wall (Fig. 9) are absolutely dependent upon the laborers, and the sooner a contractor realizes this the sooner will his balance sheet show a satisfactory margin of profit. The old-fashioned idea that "anyone will do to carry the hod" is entirely wrong. Hod carriers should be as carefully selected as masons.—Building Progress.

Bitumen Content of Coarse Bituminous Aggregates

By Prevost Hubbard

In the construction of city pavements of the bituminous type the character and quantity of bitumen suitable for the preparation of the bituminous aggregate has received a great deal of study, as well as the proper grading of the mineral aggregate, and certain facts have been determined which made it possible to specify the correct proportion and characteristics of both within narrow limits. In bituminous macadam roads a much greater variety of bitumens is customarily employed, but little attention is paid to the grading of the aggregate, other than to require a given commercial size of rock, and the proportioning of bitumen and aggregate is given scant attention compared with sheet asphalt work. The necessity for careful inspection and examination of the materials, however, is just as great as in the case of sheet-asphalt pavements.

The penetration method of constructing these roads, while frequently productive of satisfactory results when carefully conducted, is less susceptible of refinement than the mixing method. The mixing method is susceptible of considerable refinement. No matter how carefully the bitumen and aggregate are combined, unless both are systematically tested the success or failure of a piece of work can furnish but little useful information.

For a given mineral aggregate and a binder of given consistency, their proportion must lie within certain narrow limits to produce the best results. They will be obtained by combining in such proportions that the entire aggregate will be coated with bitumen in amount equal to the maximum quantity of bitumen which can be held after compaction without producing an undesirable surface under conditions to which the finished road will be subjected.

The constituents may be proportioned either by volume or weight. The former method is generally employed, but the volume equivalents of certain weight proportions are taken for convenience, and proportions are stated by weight. In the laboratory examination, proportions are almost invariably reported by weight. The exact proportions are determined by the behavior of trial batches, although the approximate proportions may be calculated in advance.

While this is satisfactory for any piece of work, a report of proportions should be accompanied by other data in order that it may be interpreted with reference to other similar work. Account should be taken of the wide variations in specific gravity of both mineral matter and bituminous materials. The maximum variation in road making rocks would be from 2.00 to 3.65. The volume relations which would exist, if the extremes were crushed identical as to sizes and mixed with 6 per cent. by weight of a given bitumen, might produce a variation of 45 to 81 per cent. in the number of gallons per cubic yard of rock. If the variation in binders is further taken into account the proportioning by weight may show greater differences in the volume proportions.

Considering the range in density of the bituminous materials in connection with the extremes in density of the road-building rocks, a 6 per cent. mix might mean anything from 11.8 to 29.3 gal. per cubic yard. With such a variation the term 6 per cent. can have but little value. A statement of volume proportions offers a much more satisfactory basis of comparison than weight proportions.

An engineer who superintends the construction can state the volume proportions which he uses in a green mix, but if the material contains considerable mineral or organic matter not bitumen, he encounters a serious difficulty. The chemist can state the weight proportions, but will often be unable to determine the volume proportions, owing to variations in the volume of a unit weight in different stages of compaction. If the material contains an unknown amount of mineral organic matter not bitumen he may also be unable to determine the proportions of the constituents. In coarse bituminous aggregates the little bitumen absorbed by the aggregate becomes almost negligible.

In the examination of a prepared bituminous mix the chemist should report the specific gravity of both aggregate and pure extracted bitumen in addition to the usual results. This should make possible an intelligent comparison of different bituminous mixes. The percentage of each constituent in a given mix divided by its specific gravity gives a rational volume proportion, and from this a rational per cent. may be computed for each. The rational per cent. of bitumen will not only serve as an improved means of comparing aggregates, but may be used in calculating the proportions for a mix if the properties of the constituents are previously determined.

A Temporary Single Track Bascule Span

A By-Pass Bascule with 43-ft. Opening for Reconstruction Service with Regular Plate-Girder Span Operated by a Hoisting Engine

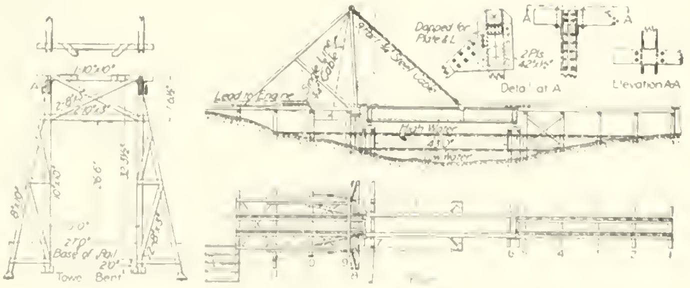
THE extensive improvements of the main line tracks for a distance of 5000 ft. to a maximum Elizabeth, N. J., include raising the double of the Central Railroad of New Jersey at height of 15 ft., chiefly on solid embankment, with bridges across the street openings and across the Elizabeth River. Opportunity for the new construction is afforded by the diversion of traffic temporarily to a single-track by-pass line, at former grade, parallel to and about 32 ft. distant from the old tracks. The by-pass line crosses the Elizabeth River on a short tile trestle viaduct with a clear center opening of 43 ft. spanned by the bascule bridge which is the subject of this article. The river was formerly crossed here by a double-track turn-table swing bridge parallel to and 42 ft. on centers from the temporary span, which had an opening about 45 ft. wide in the clear on each side of the pivot pier, and will be replaced by a double-track steel bascule span of the Scherzer Rolling Life type with a clear opening of 60 ft., which occupies substantially the same position as one of the openings in the old swing span, and, having a clearance of 18 ft. above mean low water, will permit the passage of many small craft, for which the old bridge with a corresponding clearance of only 11.5 ft., required to be swung.

General Description

The temporary bridge is entirely of wood excepting the bascule span and its operating tackles. It was designed to provide for a heavy passenger express traffic at good speed, to be in service for perhaps as much as two years and to be of simple and economical construction, easily operated and providing for some elasticity of structure and ready adjustment.

A regular fixed deck plate-girder span, 48½ ft. long and 5 ft. deep over all, weighing about 45,000 lb., was modified to serve as a bascule leaf by the addition at one end of heel pieces pivoted to fixed pedestals on the substructure and by the addition of connections a little more than half way from the pivot to the opposite end of the span to receive the hoisting tackles by which it is operated. When in service the girders are seated on I-beam grillages on pile piers separated from the approach viaduct which at one end carries the pivot pedestals supporting the bascule during its revolution.

The span is operated by two 9-part steel cable tackles attached to the girders and to the top of a triangular tower seated on the approach trestle. The hoisting lines of the tackles are led under the track through snatch blocks lashed with wire ropes to the track stringers and thence to separate drums of a double-drum engine located on shore at one side of the track just beyond the rear legs of the tower. Although the tackles are rove with long pieces of cable and are entirely independent and separately operated without the application of any equalizing device, it was found that after a little stretching in use and careful adjustment they operate with great uniformity, and both drums being simultaneously controlled, handle the bridge smoothly and evenly without difficulty and without cramping, twisting or apparent distortion. The 30 horse-power American Hoist & Derrick Company's hoisting engine installed is equipped with a 30-horse power boiler and can open or lower the bridge very quickly. The bridge is not provided with locks or automatic signals, but is never opened until the danger signals are set by the attendant who operates the rail locks and hoisting engine and maintains steam in the boiler.

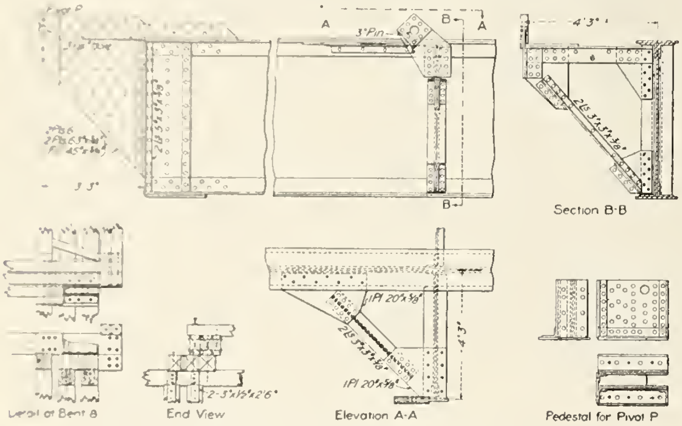


By-pass bridge and bascule tower

Tower

The triangular tower consists essentially of a gallows frame main transverse bent about 33 ft. high over all with two longitudinal horizontal sills and two inclined back legs in the vertical planes of the sills, 15 ft. apart on centers.

The main bent, which is inclined 21 in. from the vertical toward the shore at the top, has two vertical posts connected by portal bracing at the top and having batter posts braced to them on the outside. Train clearance is provided between the vertical posts of the lower ends of the latter and shouldered on and bolted between the double pieces of the sills. The lower ends of the batter posts are bolted between wide flange angles which virtually form shoes anchored to the substructure. The tops of the vertical posts are engaged in rectangular pockets made of steel plates and angles with the former projecting in the rear to form jaws in which the upper ends of the back legs are bolted. The angles project beyond the tops of the vertical posts to engage the main cap which extends beyond them and rests on horizontal shelf angles riveted to the jaw-plates. A rigid connection is thus formed for all of the converging members at this point, which are thoroughly bolted together, and a satisfactory connection is also provided for the upper blocks of the operating tackles and for the guide sheaves over which the hoisting line is led to the snatch blocks below the tracks. The main cap is provided with bumpers offset on the river side and wound with old hemp rope to cushion the bent against possible impact from the bascule girders if they should be revolved to their extreme position.



Bascule girder and pivot seat

Tower Foundation

The substructure for the tower consists of a framed timber platform x-braced and thoroughly bolted to the pile foundation. The caps of the river bents are about 30 ft. long over all to give lateral stability for the tower and for each girder, support three lines of 8 x 16-in. stringers thoroughly bolted together with cast-iron separators so as to leave 2-in. clearance between them, and slotted to clear the bases of the pivot shoes bolted to the caps. The stringers break joints so that the center one splices the outer ones, and vice versa, and two of them overlap the end of each bascule girder, thus providing continuous support for the track ties.

Girder Details

The principal changes required by the girders to transform them from fixed to bascule span service were the addition of heel pieces for the pivots and outriggers for the tackle connections. The end web stiffener angles of each girder were removed and one full-depth ¾-in. steel plate, 5 ft. 3 in. long, was riveted to each side of it with a ⅜ filler between them in the 3 ft. 9 in. projection. The web stiffener angles were re-riveted over the heel plates and horizontal tension angles were riveted to both sides of the heel plates, and, projecting beyond them, were riveted to the top flanges of the girder. The end of the bottom flange of the girder below the heel plate was ground rounding and the old sole plate at the opposite or lifting end of the girder was replaced by a new one.

Cantilever brackets were field-riveted to the outer faces of the girders about 6 ft. beyond their center points and were stiffened against longitudinal pull by heavy horizontal knee braces riveted to the top flanges of the girders. They were provided 4 ft. 3 in. beyond the girder centers with pin plates 15 ft. apart on centers to which shackles were attached for the hoisting shackles thus separated far enough to provide suitable train clearance. The girders were pivoted on 3-in. pins with bearings 2⅝ in. long in the reinforced sheet plates and with bearings 2 in. long in each of the double webs of the pedestals. The pedestal webs were connected by a vertical transverse rear diaphragm bearing against the substructure timber and their bottom flanges were securely bolted to the pile caps. When in service the girders took bearing at each end on grillages of three 15-in. I-beams with top and bottom cover plates. Deck plates with divergent flanges were riveted to the forward grillage to guide the girders to entrance on their seat when lowered.

This span has been erected and maintained with a considerable economy over any other estimated form of temporary span. It has now been in service about 12 months and has been operated during 10 months of the year, as many as 3 times per day, by a single attendant. It was designed and installed by the engineering department of the railroad, Mr. Joseph Osgood, chief engineer.

Better Roads and How They Should Be Built

THE Manitoba Good Roads Commissioner, Mr. D. McGillivray, has prepared an interesting and practical pamphlet on the above subject. The pamphlet, which is issued under the authority of the Public Works Department, contains valuable information in the matter of the construction, financing, repairing and maintenance of highways.

The following is given as a proper plan to follow in the construction of roads:

The selection of the roads to be improved at the present time, the location of these roads being so placed that their improvement would benefit the greatest number of residents of the district and be a general improvement to the community as a whole.

Engineer's Services

The securing of the services of an engineer with whose assistance the lines of roads to be improved would be finally located and the following information secured:

(a) Information with regard to the necessary drainage of the roads. (This is most essential as the life and usefulness of the road depends entirely on its drainage).

(b) Preparations of plans and profiles of the roads and drains, with specifications, covering the whole work.

(c) Estimate of cost of proposed work.

(d) Providing ways and means of securing the necessary funds for carrying on the work to completion.

(e) Letting of the work by contract. It is generally more satisfactory to have work of this character performed by contract, if it can possibly be arranged, which can generally be done in new work. Sometimes work which consists of re-building, improving old drains or extending the width or height of old roads, can be done more satisfactorily by day labor.

(f) Appointing a competent man as superintendent or overseer who will see, in cases where work is being done by day labor, that proper organization for executing the work is established and maintained along the strictest lines of economy with a view of attaining the most satisfactory and durable results.

How to Proceed

Among the other things contained in the work were the following:

"It would appear advisable when contemplating a scheme of improvements of this kind to take into consideration several points connected with it. These might be as follows: The particular highway upon which the improvements are to be made, the nature and extent of such improvements, the estimated cost of carrying the work to completion, the method of collecting sufficient revenue to meet this expenditure, and the financial ability of the community to assume the estimated liability. There is no doubt that a proper representation of the whole matter should be put before the people so that it might be thoroughly understood by them, before asking them to decide upon it. Meetings should be held at which all phases of the question might be discussed, and the taxpayers enlightened in the proposed expenditures and the benefits and results which are expected to accrue. Road improvement is simply a business proposition, and as such should be dealt with along business lines. No private company or corporation would think of launching into a scheme of extensive improvements in its business without deliberation or reflection. What is required in all business undertakings is organization, and road building is no exception to this rule. Systematic organization is just as necessary in its initial stages as it is in the final execution of any plan that may be adopted.

Statute Labor

There are many methods of procuring revenue for the improvements of the highways. Among these may be mentioned statute labor, direct taxation and bond issues.

A reference to the system of statute labor contains the following:

The system of statute labor which has been in vogue in this country since the formation of the first municipality, permits the payment of road taxes at the option of the taxpayer in labor instead of cash. There has been a large amount of criticism of this system in late years, many of the municipalities of this province having entirely abolished it. So far as the system itself is concerned, there does not appear to be very much that can be said against it. Road improvement is almost entirely a matter of labor and its direction. It is the abuse of the system that has thrown it into such bad repute in the minds of so many. Many men who work out their road taxes do so without the least feeling of responsibility, their only object being to relieve themselves of their obligation in the easiest manner possible

Honest Work

If every man would give the same honest day's work in the performance of statute labor as he would be compelled to do if working for a private corporation, there is no gainsaying the fact that it would be possible to accomplish a great deal of good in the way of road maintenance and improvement. It might be said in defence of the system that a road commissioner or pathmaster who would be unable to extract a proper day's work from a man performing his duties of statute labor, would be equally unable to secure a just production of labor from the same man for any stipulated wage, so that in cases where the working out of the system fails to satisfy the ends which it is intended it should, the fault does not rest altogether with the system, but in most instances with the manner in which it is carried out.

Its Disadvantages

On the other hand, the principle upon which this system is carried out, divides the municipality into numerous small road districts, in which the management of the work is assigned to pathmasters, who have full control of the labor, and the manner in which it shall be performed in their respective districts. This tends to disrupt the idea of uniformity of construction in the municipality, and with the continual change of pathmasters, prevents to a large extent, the continuity or uniformity of work even in a unit district, because it will seldom be found that a pathmaster will follow out the ideas and work initiated by his predecessors. If all the road work of a municipality were put under the supervision of a competent man, who would not hesitate to demand a fair day's work, and who would see that the proper methods of carrying on this class of work were put into effect, there would soon be a vast difference not only in the kind of work performed, but also in the amount that would be done each year.

Much valuable information is also given as to construction of drains, ditches, location of roads, gradients, clearing and grubbing, gravelling, building culverts, both wooden and concrete, how pipes should be laid, whether made of concrete or vitrified earthenware, construction of bridges, foundations, etc., and the best means of maintenance, repair, etc.

Fast Progress on Vancouver Work

Messrs. Baynes & Horie, Architects and Contractors

Remarkably fast progress has been made by Messrs. Baynes & Horie on the six-storey building which is being erected on the corner of Homer and Dunsmuir streets, Vancouver. The building is of reinforced concrete and steel construction, with brick walls, faced with terra cotta. Seven stores are contained on the ground floor, the upper floors containing offices and apartments. Fir is used as inside finish throughout. The building is estimated to cost $160,000. Messrs. Baynes & Horie were the architects, and they also had charge of the construction work.

Building on corner of Homer and Dunsmuir Streets, Vancouver.

The City of Ottawa — the Federal Capital

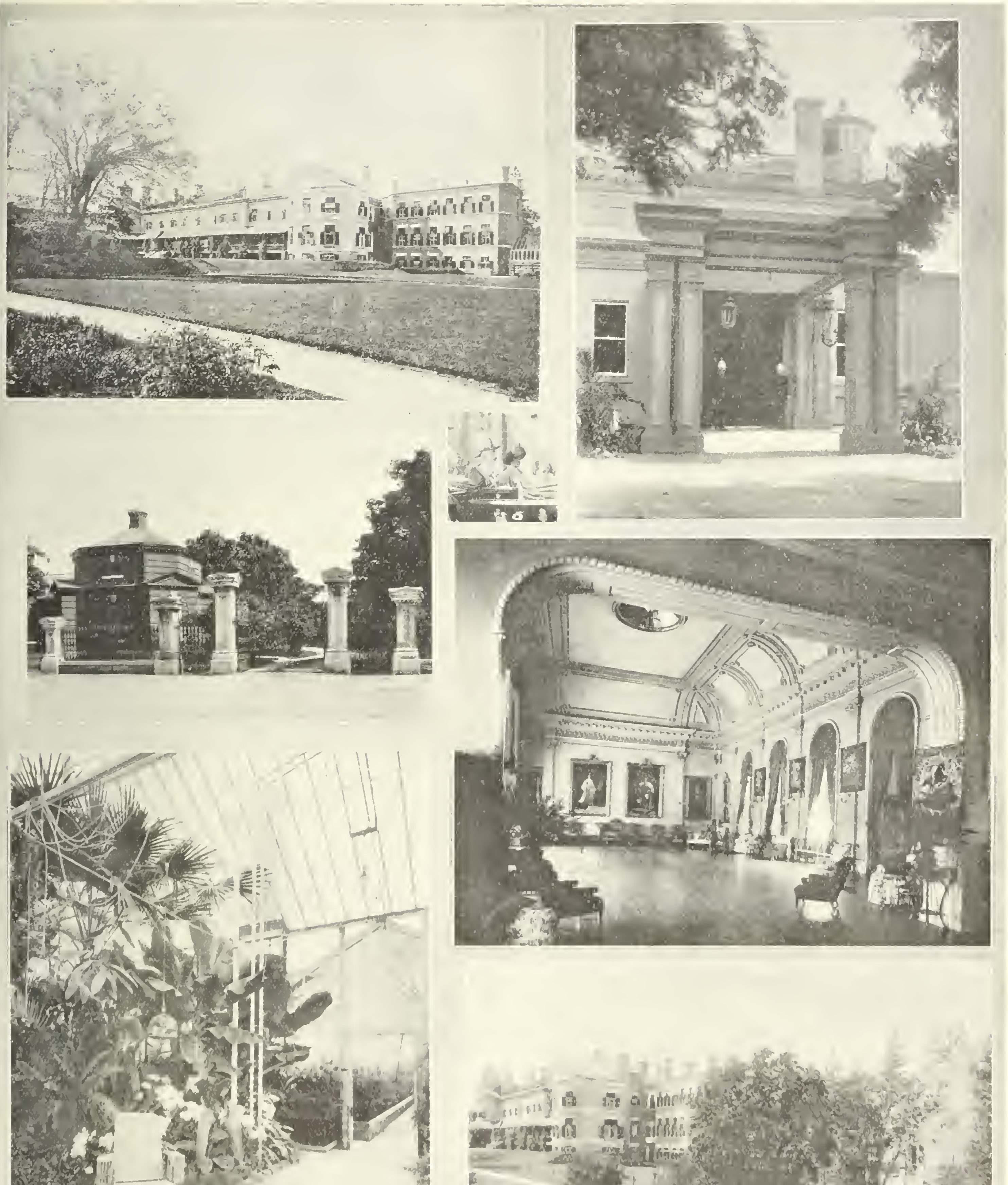
Its History, Development and Possibilities, with Special Reference to Features of Engineering and Constructional Interest

THE city of Ottawa has been designated in various ways. The late Anthony Trollope described it as "the Edinburgh of British North America"; the late Charles Roberts, the New Brunswick writer, called it "the City of Laws and Saws," while Sir Wilfrid Laurier has referred to it as "the Washington of the North." But the proudest title that it possesses, the title which has made the city what it is and which will raise it to still greater eminence, is THE FEDERAL CAPITAL OF THE DOMINION. It may be asserted safely that no other city in Canada, or for that matter on the American continent, possesses the noble and commanding site, the picturesque surroundings and the great natural advantages that are bestowed on Ottawa. It is generally conceded that Ottawa is beautiful beyond the beauty of all other cities of Canada and the United States.

The name Ottawa has a long and honorable association, it having originated with an Indian tribe, the Oudatawa, whom Champlain discovered in 1615. The French contracted Oudatawa into Outaouas. Most of the information available concerning the tribe is derived from the narratives of the 17th century, which were written by men who dealt with the Outaouas in a business way. All the writers agree as to the character of the people and as to their various migrations, but none makes any allusion to the name adopted by the tribe, and so they have passed into history. It is surmised that the Oudatawa with a consciousness of their superiority over other tribes simply called themselves "The Men"—the men par excellence. In a brief historical resume of Ottawa one finds that the city was formerly known as Bytown, incorporated as a village in 1827 and as a town in 1847. In 1854, the year of the incorporation of the present city, the municipal councillors of Bytown looked for a new name for the city and christened it Ottawa, adopting the word from Charlevoix, who in 1740 writing his history of New France, spoke of the Outaouais (Outaway) and said that the tribe lived on the river bearing their name. His book was the only one that could be obtained upon the history of Canada until 1830, and even then the errors of Charlevoix were reprinted by Canadian authors who did not know much, as a rule, about the ancient tribes of the country. Far from residing on the river, the Oudatawa were chased from Manitoulin Island in 1649 by the Iroquois, and went to Green Bay. It is from there they started the first caravan towards Montreal in 1654. A branch of them settled also on the south shore of Lake Superior, so that yearly the rendezvous of the traders from Wisconsin East and those of Lake Superior was at the foot of St. Marie River, to go to Montreal.

The city of Ottawa was selected by her late Majesty, Queen Victoria, as the capital of the Dominion in 1857, an act which was ratified by the Canadian Parliament in 1859. Previous to 1877 Ottawa was divided into five wards and its area consisted of 1,705 acres. The city is now divided into nine wards, comprising 4,884 acres. The village of New Edinburgh was annexed in 1887; the township of Nepean, known as Bayswater, the village of Hintonburgh, part of the township of Nepean (including Ottawa South and Rideauville) and the village of Ottawa were annexed in 1907; and that part of the township of Nepean "west of Bayswater" was annexed in 1909. This year—in fact only two months ago, the village of Eastview voted for annexation to the city, and if it

Picturesque Ottawa—the heart of the Federal Capital, showing the Chateau Laurier and the new station, the city's latest and greatest building acquisitions



Rideau Hall, the official residence of His Royal Highness the Duke of Connaught, Governor General of Canada takes place nearly four thousand people will be added to the present population. Several large industries will also be included.

When Ottawa became incorporated as a city in 1854 it adopted the motto "Advance" and its records since the year of Confederation, 1867, and more particularly of recent years, have been in accord with the word. At Confederation the population was 18,700, while to-day it is approximately 100,000, with a total assessment valuation of some $100,000,000.

OTTAWA AS A RAILROAD CENTRE

Ottawa is fast becoming a great railway centre, and occupies a position as fortunate as it is unique. This city will be the natural terminus of all roads coming from the north, and all roads of any importance running east and west will pass through it.

The following are the railways passing through or terminating in Ottawa: The Canadian Pacific, Transcontinental Line, the Short Line and North Shore route to Montreal, the Gatineau Valley Division, the Prescott Division, the Brockville Division, the Grand Trunk Railway (Canada Atlantic Division, extending from Coteau to Parry Sound, to Swanton, Vermont); the New York & Ottawa Railway, and the Ottawa, Hull and Aylmer Electric Railway. The Ottawa, Smith's Falls and Kingston Railroad is likely soon to be constructed and when completed will be operated by the Grand Trunk Railway. The capital will also, at an early date, be on the main line of the Canadian Northern Ontario Railway.

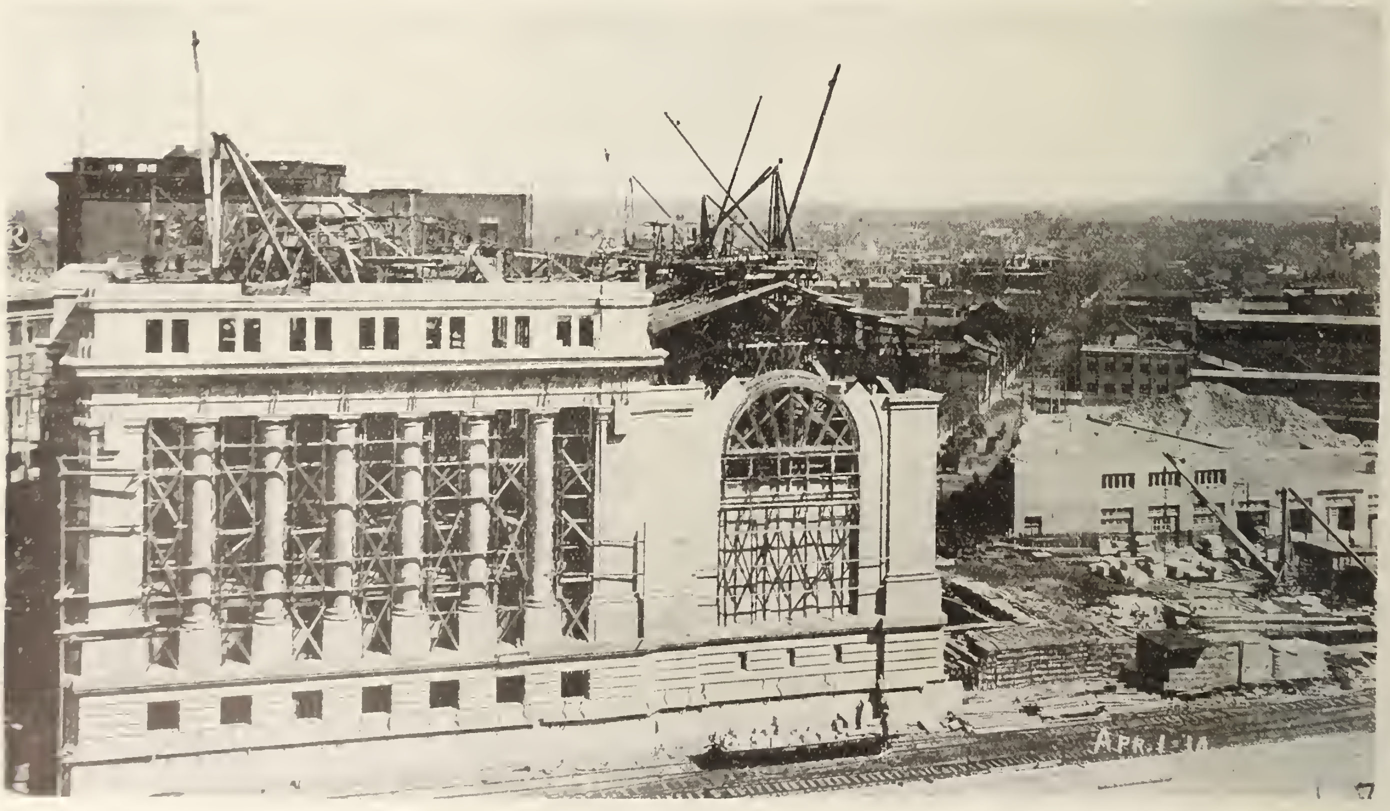
Several electric roads, to run from the capital to nearby towns on the St. Lawrence and Ottawa rivers, are now being planned, and will, no doubt, materialize in the very near future.

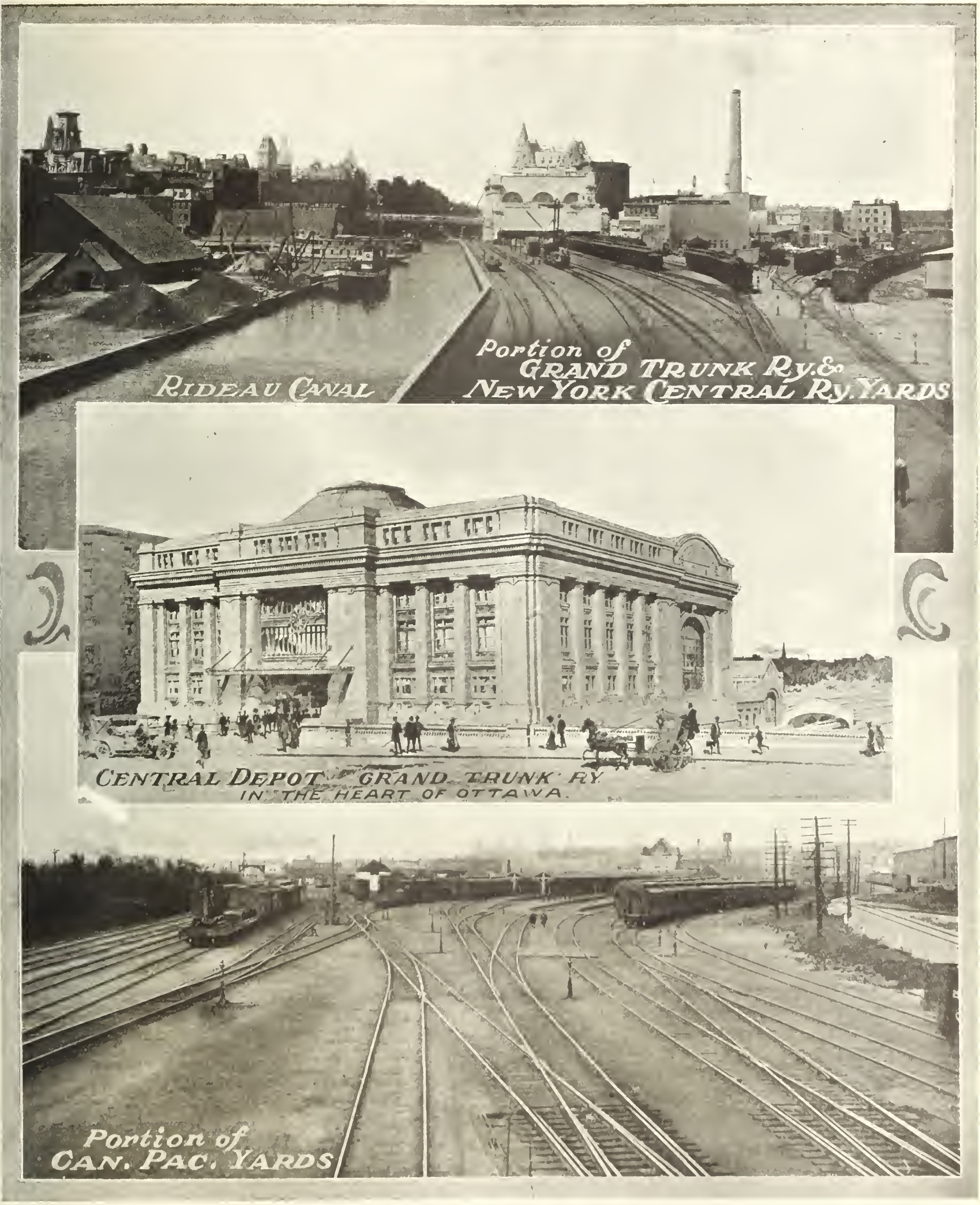
From a photo of the Chateau Laurier during erection. The architects for this magnificent building were Messrs. Ross & MacFarlane, of Montreal, and the contractors, the Geo. A. Fuller Company, of Montreal.

The Ottawa Electric Railway is one of the attractions of the Federal Capital that never fails to elicit favorable comment from municipal visitors. There are about sixty miles of railroad tracks in the city and the cars, which are heated by electricity, are models of comfort and cleanliness. A conspicuous feature of the Ottawa Street Railway is its vestibule cars, which run along Somerset street to Britannia. These cars are an innovation in street railroad equipment which have attracted much attention.

OTTAWA AS A CITY OF BUILDINGS

Ottawa by virtue of its many stately public edifices may justly lay claim to be a city of buildings. The notable structures are the Parliament Buildings, the Departmental Blocks, the Langevin Block, the Victoria Memorial Museum, the Chateau Laurier and the G. T. R. depot. Inasmuch as a view of the Par-


The Central Station at Ottawa, as it appeared under construction. The architects were Messrs. Ross & MacFarlane, of Montreal, and the contractors, Messrs. Peter Lyall & Sons, Montreal


RIDEAU CANAL
Portion of GRAND TRUNK Ry. & NEW YORK CENTRAL Ry. YARDS
CENTRAL DEPOT GRAND TRUNK RY IN THE HEART OF OTTAWA.
Portion of CAN. PAC. YARDS

The transportation facilities of the Federal Capital

Chateau Laurier, showing veranda

Chateau Laurier, showing finished portion of plaza and temporary tracks on Wellington Street

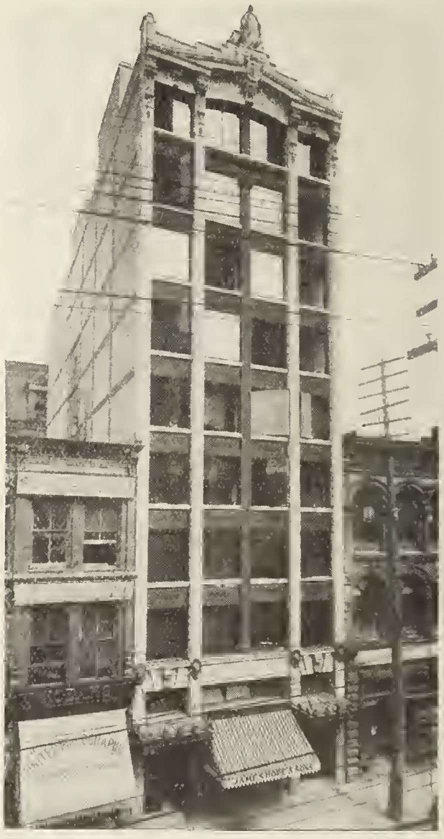
liament Buildings is shown on another page it may be of interest to include a brief description thereof.

The general style of architecture of the buildings is a modified 12th century Gothic. The principal material used in their construction is a hard, cream-colored sandstone, from the adjacent township of Nepean. The dressings, stairs, gablets, pinnacles, etc., are of Ohio freestone, while a pleasing variety is given to the whole by the relieving arches of red Potsdam sandstone, over the window and door openings. The roofs are of Vermont slate, except the Western block, which was changed from slate to copper after the fire some years ago. The slate is of a dark blue color variegated by light green bends. The marble was obtained at Arnprior, and the timber used, excepting the oak, came from various localities in the Ottawa Valley.

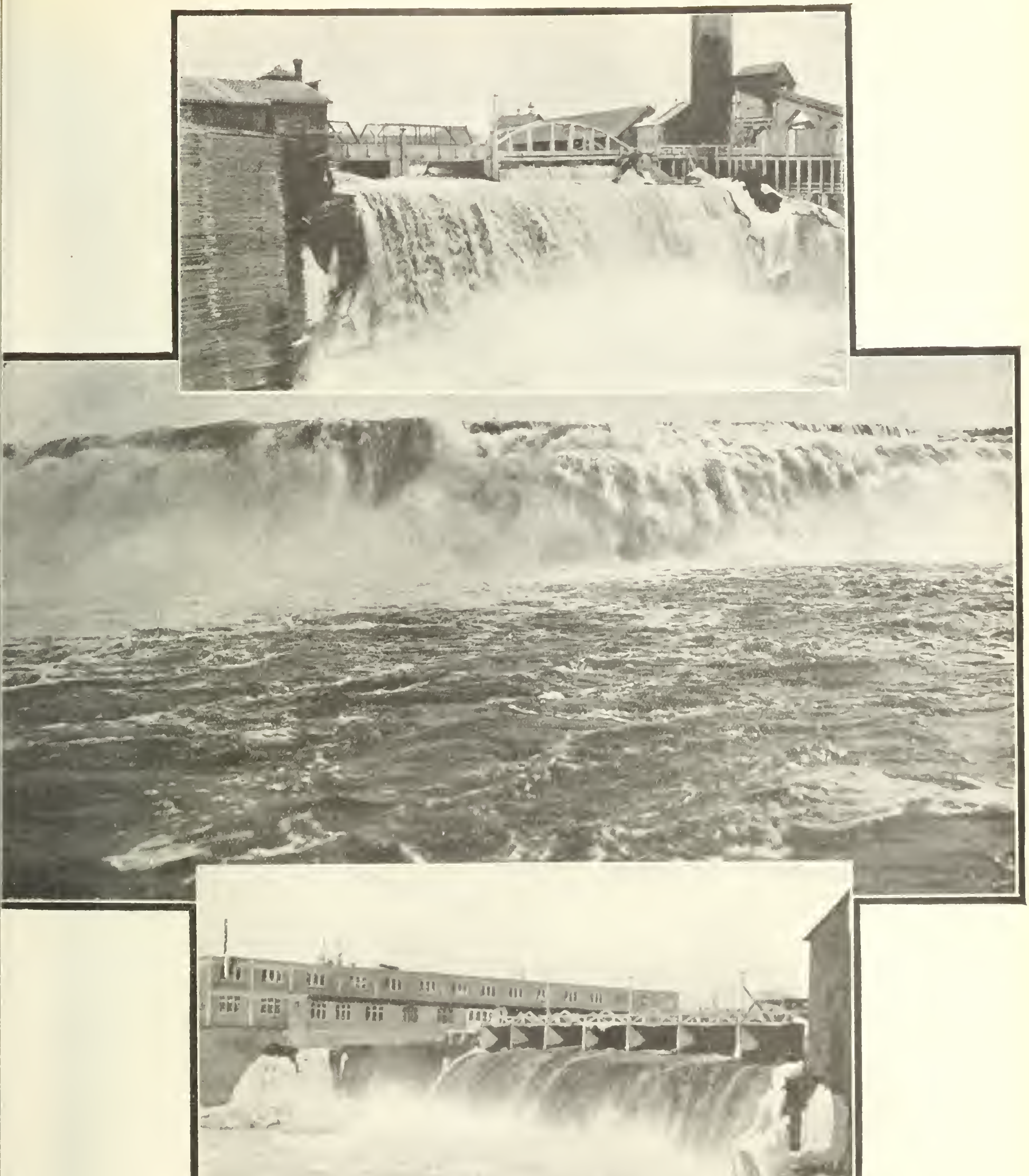
OTTAWA AS A POWER CENTRE

No city on the continent is more favorably situated in the matter of abundant water power close at hand than the city of Ottawa. The drainage basin of the Ottawa river is in the neighborhood of 45,000 square miles and the length of the river over 450 miles. The river at the present time has a minimum flow of 11,000 c.f.s. at Ottawa. At the Chaudiere Falls a modern concrete dam located within the limits of the twin cities of Ottawa and Hull creates an available head of

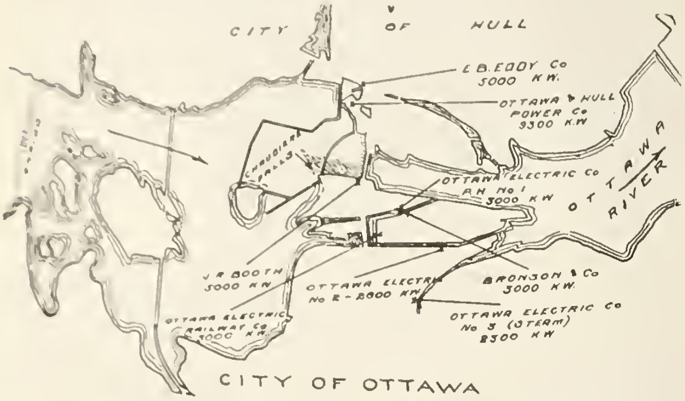
The Rosenthal Building, completed last year. Mr. A. LeB. Weeks, was the architect and Mr. C. E. Deakin, Montreal, the general contractor.



The Hope Building designed by Mr. W. E. Noffke and built by Messrs. Holbrooke & Sutherland.



The sources of Ottawa's power—the twin Rideau and Chaudiere Falls, located in the heart of the city about 30 ft., giving an average of (say) 60,000 h.p. and a minimum of about half this amount. In addition, some three miles up the river, at Des Chenes, there is an 8½ foot fall, partly developed, while between this point and the city there is a series of little rapids giving a total fall of 11 to 12 feet.


CITY OF HULL
E.B. EDDY Co 5000 K.W.
OTTAWA & HULL POWER Co 9300 K.W.
CHAUDIERE FALLS
OTTAWA ELECTRIC Co AH No 1 3000 KW
OTTAWA RIVER
J.R. BOOTH 5000 K.W.
OTTAWA ELECTRIC No 2 - 2000 KW
BRONSON & Co 3000 K.W.
OTTAWA ELECTRIC Co No 3 (STEAM) 2300 KW
OTTAWA ELECTRIC RAILWAY Co 7000 K.W.
CITY OF OTTAWA

Map showing location of water plants at Ottawa

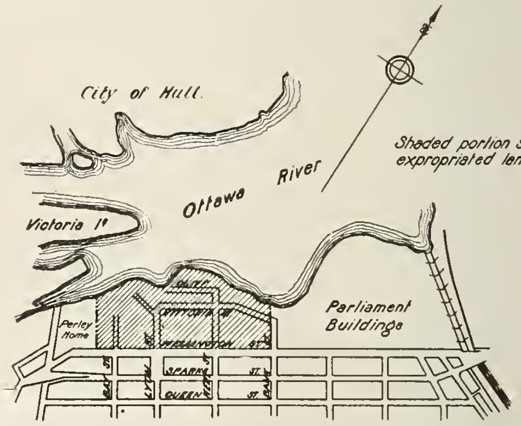
One of the main difficulties in the way of further hydraulic power development has been the irregular flow of the Ottawa river which varies from the minimum of 11,000 c.f.s. mentioned above to a maximum of about 100,000 c.f.s. To remedy this condition, in part, the Dominion Government is constructing regulation dams at the foot of Temiskaming Lake, at Kippewa Lake, at Lake Expanse and at Lake Quinze, and other dams are planned, not only in this connection, but having in view the rendering of the Ottawa river navigable and the ultimate construction of a ship canal via this river from Montreal to Georgian Bay. These dams contemplated and under construction will, with the canalized river, increase the minimum flow to 28,000 c.f.s.

That cheap water power constitutes a prime attraction in the industrial development of a city is shown by the fact that every unit available, under present conditions at this point of the Ottawa River has been placed under control by manufacturers and operating companies in the cities of Ottawa and Hull. As may be seen from the accompanying sketch, most of the generating stations supplying power in Ottawa are situated around the Chaudiere Falls.

There is still, however, a vast amount of power undeveloped immediately above Chaudiere Falls, and only waiting for increased demand to be turned into electrical energy. Immediate control of the present supply is obtained by means of an arched dam above the head of the Falls, and extending from shore to shore. Storage dams built and being built by the government at the head waters of the Ottawa will insure a good yearly average discharge. Thus it can be seen that Ottawa is in a very fortunate position with regard to sources of power.

MUNICIPAL DEVELOPMENT AT OTTAWA

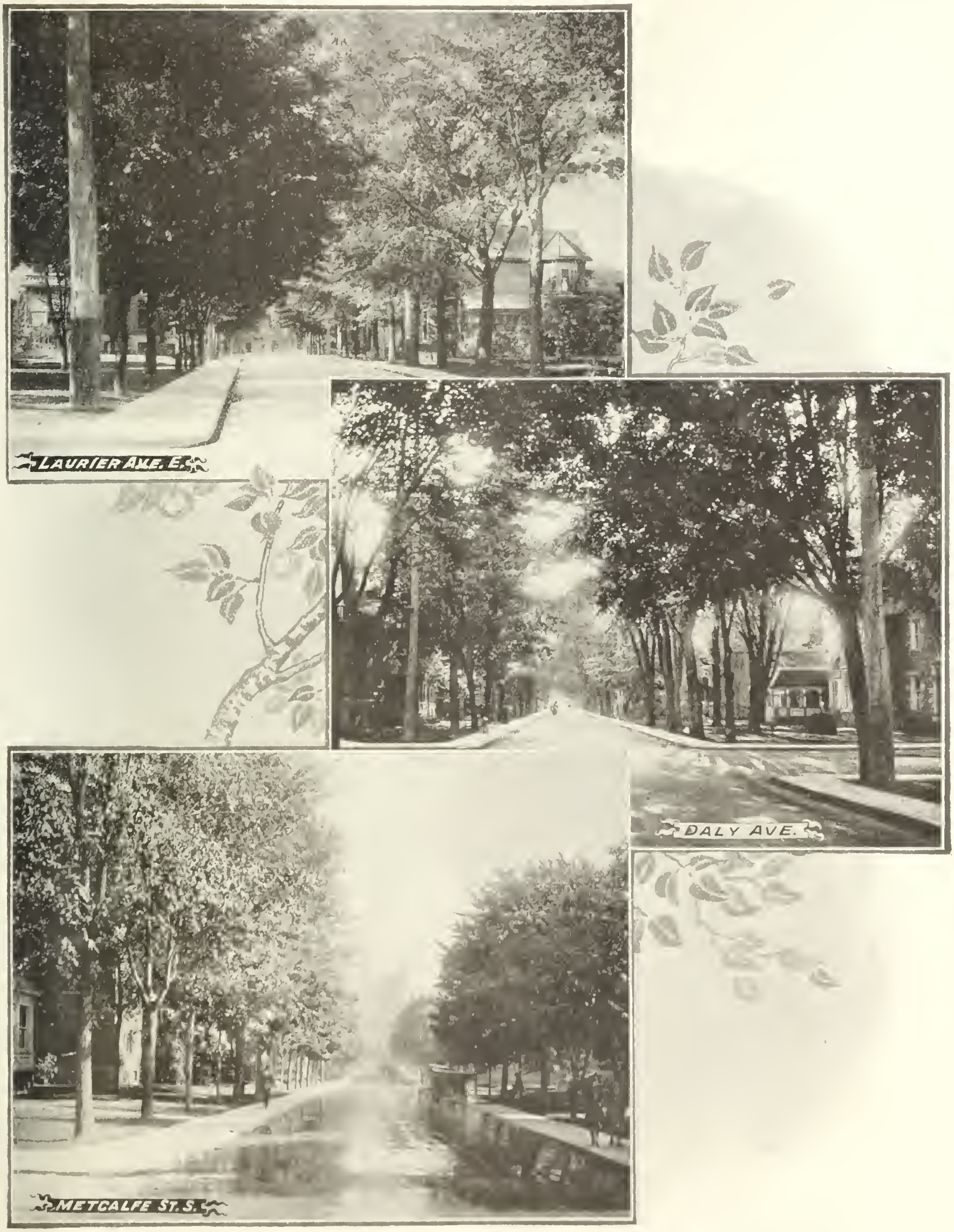
Ottawa is built upon an elevated site which, like Edinburgh, lends itself admirably to municipal work and civic improvement. The ground rises gracefully and steadily towards the hill and is sufficiently broken to add to the picturesqueness, as well as to greatly aid the work of surface drainage without which it is impossible to provide a good system of streets. Ottawa's streets are well sprinkled and well lighted. The entire city is now lighted thoroughly and at a very moderate cost. The electric lights are placed at street crossings throughout both business and residential sections, and the parks and squares are also provided for in the distribution and location of lights. There are over fifty miles of gas mains.



Plan showing land expropriated by the Government for the new departmental block

Under the efficient administration of the present City Engineer, Mr. Newton J. Ker, municipal work has progressed apace in the Federal Capital. There has been special activity in drainage and road work. In

The great Chaudiere Dam across the Ottawa River, making possible an average development of 60,000 h.p. within the city limits



Residential streets at the Capital, affording an object lesson in civic improvement and maintenance

A recent view of paving work on Sparks Street

1908 the chief works were the Hintonburgh drainage system and the Kent street relief sewer. The former was built to provide for the newly annexed suburb and was connected with the city system. It provided drainage as far west as Rosemont Avenue, south of Wellington Street, and as far as Garland Street, north of Wellington. Although not very heavy the work was largely in rock. The Kent Street relief sewer was built to relieve the old main drain built in 1874. When completed it will relieve the area from Bank street to Bay street, and from Somerset street to the Ottawa river. Great difficulty was met with in the construction of this sewer owing to the quantity of rock encountered and the large amount of water running down the existing sewers on the street. There were also a number of smaller tile pipe drains built in 1908. These were all done by the day labor system.

In 1909 the Ottawa south drainage system was started. This was to provide for the newly annexed suburb of that name. This system is entirely separate from that of the city and empties into the Rideau river. The sewage is passed through septic tanks. This work was rather light and mostly through sand and gravel. The Kent street relief sewer was completed during the winter of 1909-10 as far as Laurier avenue.

During 1910 the Ottawa South system was completed. A number of small tile pipe drains were also built. Plans were prepared for the Dow's Lake and West End Drainage System.

In the spring of 1911 work was commenced by day labor on the Dow's Lake drainage system. This system when completed will provide drainage for the area between Bank and Preston streets and from Mutchmore street to the canal. Thirty-three hundred 48-in. circular two-ring brick sewer has been completed. The majority of this work was from 15 to 26 feet in depth in rock. Owing to the large amount of water it was necessary to lay a 9-inch tile underdrain. This kept the excavation dry and no difficulty was met with.

Ottawa's new incinerator, in which machinery is now being installed

The West End Drainage System consists of 72-in., 60-in., 45-in., 42-in. and 36-in. concrete sewers. All except the 36-in. have inverts lined with brick. There are about three miles of sewers of which about two miles have been completed now. There are also two septic tanks and twelve contact beds. This work has been very heavy and was mostly through nearly solid rock

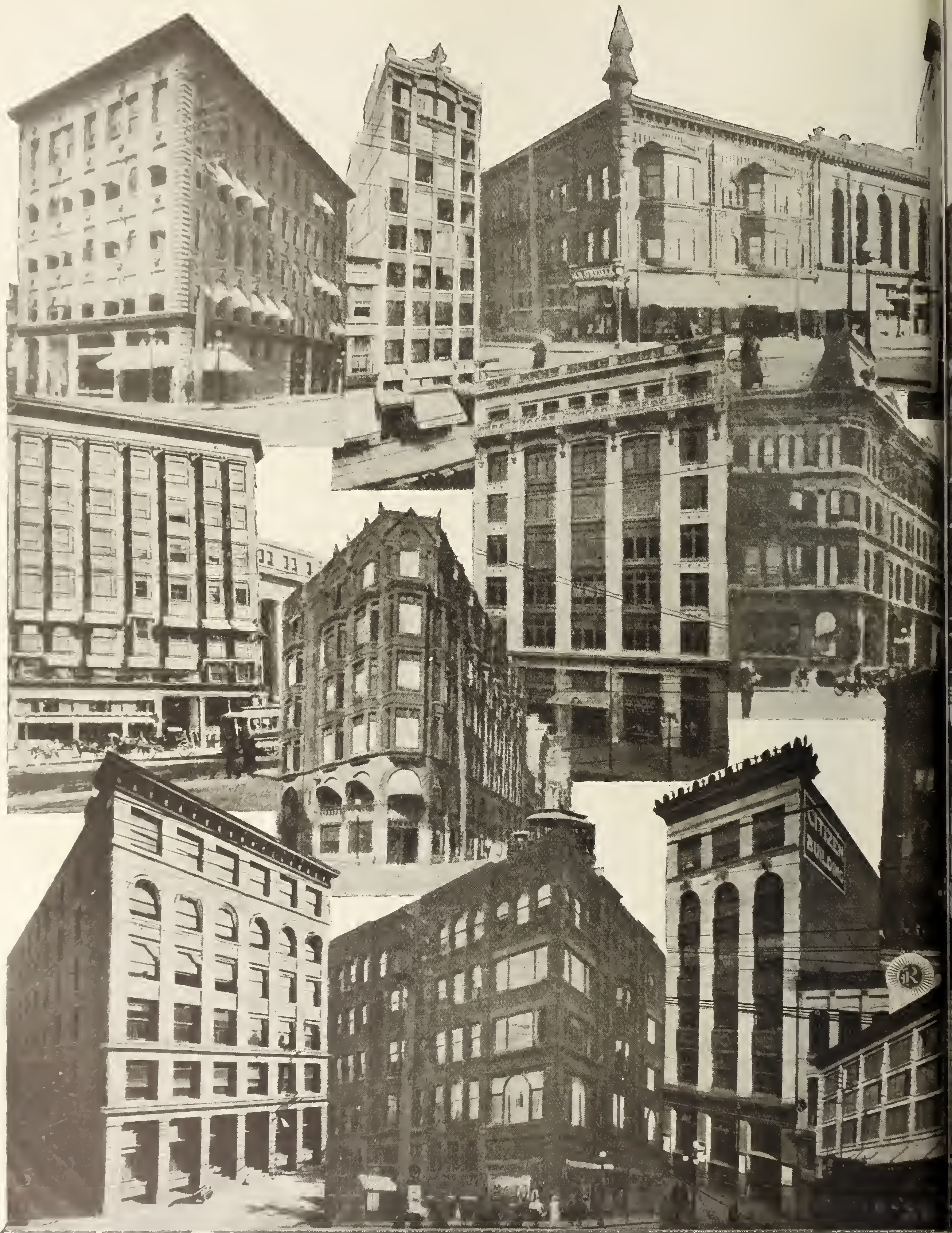
The total mileage of the sewers in the city to December 31st, 1911, was 108.65, of which 23.15 have been laid since 1907.

In our Special Annual Number of April 24 last, there was published an article describing in detail the work in progress on the new aqueduct and intake pipe. The article also included a description of the reinforced concrete bridge over the Rideau Canal on Bank street. It is interesting to note that the improvements to the waterworks system were first recommended by the city engineer in 1905. Particular emphasis in this connection was made in the city engineer's annual report for 1907, in which it was pointed out that since the works were installed in 1874-6 the mileage of mains had increased from 31 to 113 miles, the daily consumption from 2¼ millions to 16 million gallons, the ready capacity of the pumps from 9 to 35 millions and the population from 25,000 to 75,356. The general plan of improvement was outlined by the city engineer as follows, attention being directed to the fact that the first named improvement was the greatest necessity; (1) a new intake pipe and enlarged aqueduct; (2) a high pressure system for a central section of the city; (3) a reservoir. The city engineer reported that it would be necessary to have both the aque-

The Union Bank Building now under construction

(Continued on page 64)

Views of Ottawa's 30-mile driveway, famed as one of the most attractive on the continent

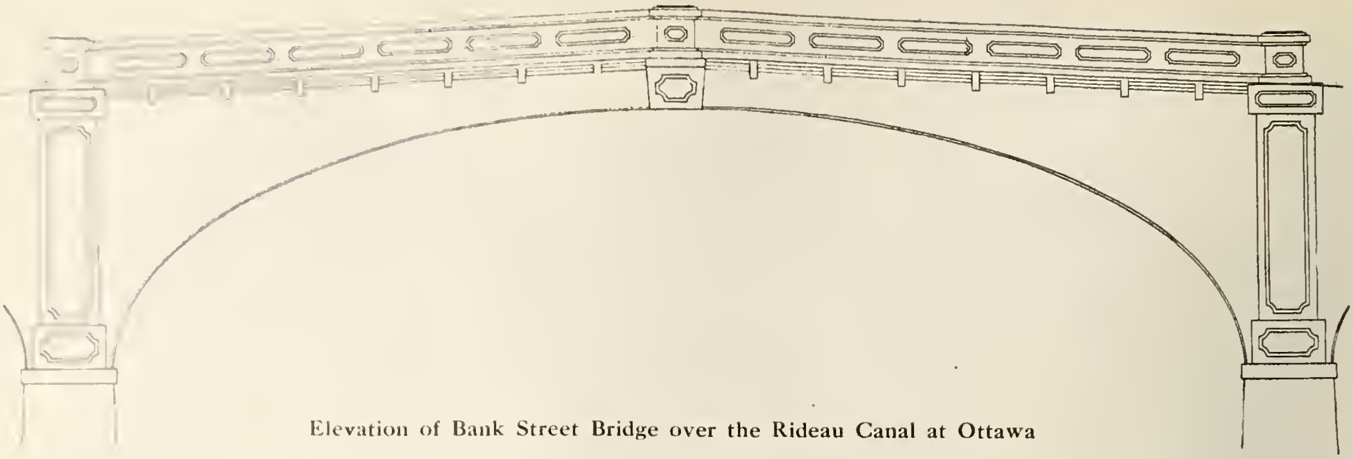


OTTAWA AS

Those who know the Capital will recognize many familiar business centres in the ab
commercial structures of recent date. Many of

BUILDINGS

do not will doubtless find some interest in a collective view of the more important
een described in detail in the Contract Record.



Elevation of Bank Street Bridge over the Rideau Canal at Ottawa

duct and the intake pipe constructed at the same time and advised that no time be lost in making the preliminary arrangements. In spite of these and previous recommendations, however, it was not until September, 1908, as was pointed out in the previous article to which we have referred, that the Ottawa city council made the required arrangements.

The activity in the roadways department is shown by the following tables, which give the amount of construction carried on under the head of permanent pavements and concrete sidewalks. In the first table there is shown an increase in mileage in five years of 15.05 and in the second an increase in mileage in five years of 42.19.

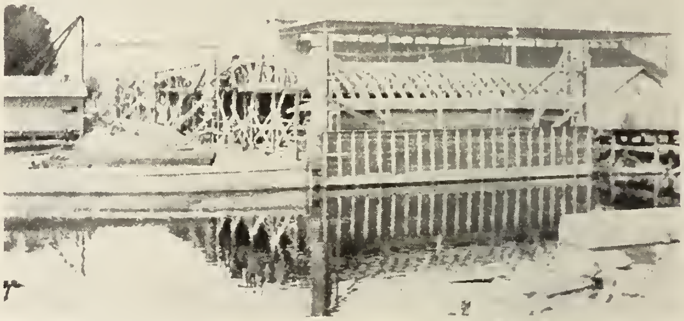
PERMANENT PAVEMENTS

Year	Mileage	Increase in Mileage over Previous Year
1907	13.94	3.73 mi.
1908	16.63	2.69 "
1909	18.67	1.94 "
1910	22.14	3.47 "
1911	25.36	3.22 "

CONCRETE SIDEWALKS

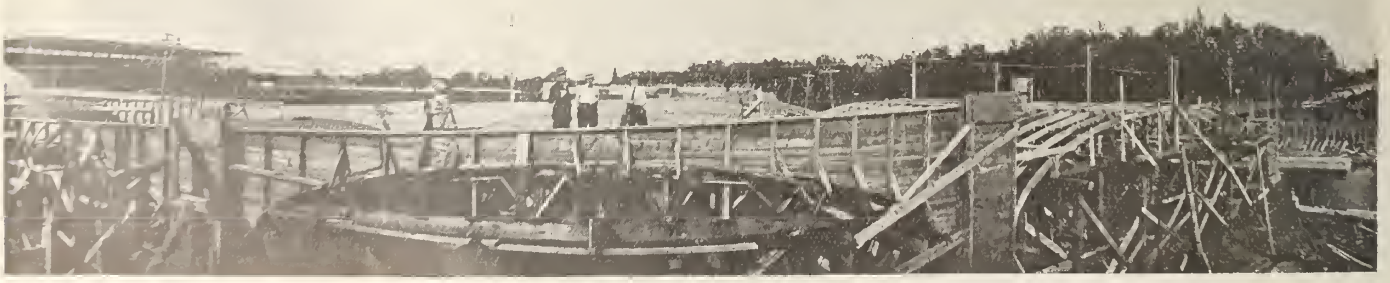
Total	Mileage	Increase in Mileage over Previous Year
1907	129.34	3.90 mi.
1908	135.3	5.96 "
1909	144.84	9.54 "
1910	156.66	11.82 "
1911	167.63	10.97 "

Of the special works now being carried to completion the Bank Street Bridge is entitled to special mention. This structure is of reinforced concrete arch construction and spans the Rideau Canal at Bank street. The main channel is spanned by a 76-ft. arch giving a clearance of 29 feet between intrados at crown and water level. The north approach consists of arches of 62 ft., 50 ft. and 40 ft. spans and an earth fill between concrete retaining walls while the south approach is similar with the exception of the 40-ft. arch, which is omitted owing to the rising ground south of the canal. The total length of the bridge, including approaches, is 630 feet. The curve of the intrados of all arches is elliptical. The grade on both approaches is 5 per 100. The present fill will be excavated under the 62 and 50 ft. arches on the south side, giving a waterway of about 200 ft. The fill over the arch rings is contained by spandrel walls whose thickness at the top is 24 inches, and at the base 4/10 of the height. A forty-foot roadway is provided, together with two 8-ft. concrete sidewalks. The roadway on both bridge and approaches will be paved with creosoted wood blocks on a 6-in. concrete base.

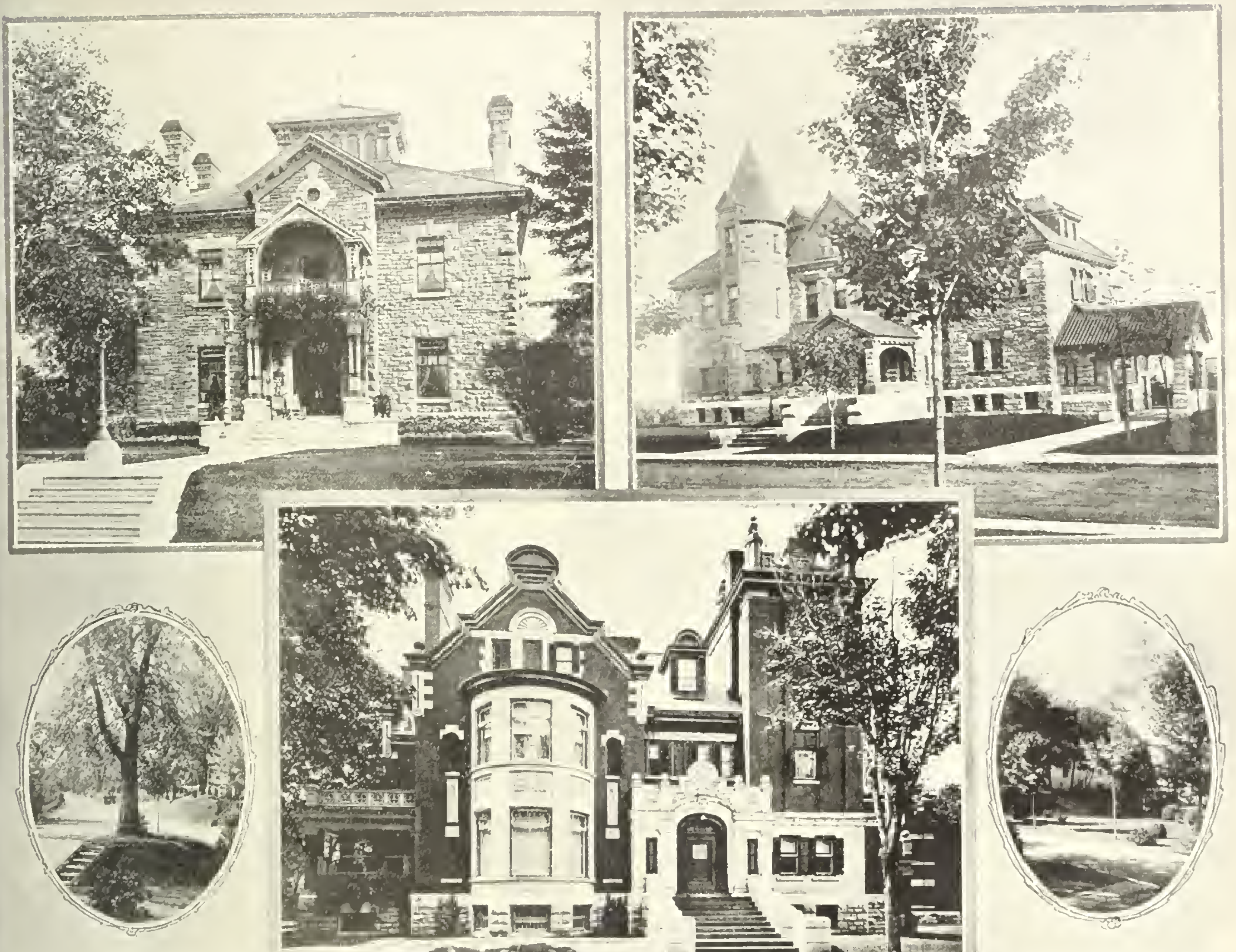


Operations in progress on the Bank Street Bridge

As showing the increased responsibility of the city engineering department during the last decade it is of interest to note that in 1901 the total expenditure



An earlier view of the Bank Street Bridge now under construction



Ottawa is famed as a residential city. The above views are typical of many palatial homes to be found at the Capital was $413,704, as compared with $1,096,827 in 1911. From 1900 to 1911 the total expenditures in this department have amounted to $6,396,935.

At the end of 1911 the street mileage was 152.51; the mileage of permanent pavements 25.36; the mileage of water mains 154.32; the mileage of concrete walks 167.63; the mileage of sewers 108.649; the mileage of street railway tracks 31.01, and the mileage of road bed occupied by street railway tracks 14.67. During 1911, 4.333 miles of sewers were laid. The total length of concrete walk laid during 1911 was 55,884 feet, and the length of crossings 2,039 feet. The combined length of walks and crossings laid was 57,923 feet, or 10.97 miles, bringing the mileage of concrete walks up to a total of 167.63 miles.

Mr. Newton J. Ker—City Engineer of Ottawa, Ont.

Mr. Newton James Ker was born at Brantford, Ont., on May 6th, 1866, and was educated at the Brantford Collegiate Institute, after which he entered the office of his uncle, Mr. P. A. Peterson, at that time chief engineer of the Canadian Pacific Railway at Montreal.

The City Engineer—Mr. Newton J. Ker

The first work of importance with which Mr. Ker was connected was the construction of the Canadian Pacific Railway into Montreal from Lachine to Windsor street. He was then engaged upon the Canadian Pacific Railway Esplanade entrance into Toronto; the construction of the Canadian Pacific Railway bridge over the Thames at London, Ont., under Mr. W. T. Jennings, C.E.; the Detroit extension at Windsor, having charge of that section running out of Windsor, and subsequently of the division between Windsor and Chatham, under Mr. Malcolm H. McLeod, C.E.

Mr. Ker was on his way to accept a position on the Virginia, Roanoke and Ironton Railway, Virginia, when he was offered a position by Mr. Jennings, then City Engineer of Toronto. His first work in Toronto was in connection with the arbitration between the city and the old Toronto Street Railway Company. Subsequently he had charge of the reconstruction of the system from a horse-car to an electric system, acting as engineer for both the Toronto Railway Company and the city of Toronto. During his ten years' service in the City Engineer's office at Toronto, Mr. Ker filled the position of engineer in charge of roadways, engineer in charge of sewers, assistant engineer on waterworks, engineer in charge of the Queen street subway and Island survey, lake under current observation, chart of Toronto Bay, and many other works of importance.

In 1899 Mr. Ker was appointed Assistant City Engineer of Ottawa, and engineer in charge of the main drainage system, a work which was built within the estimated cost of $500,000. He was appointed City Engineer in 1900, and, despite many tempting offers, has remained faithful to the Federal Capital and to the many important undertakings that have been either completed or inaugurated under his able direction.

Ottawa's First Magistrate—Mr. Charles Hopewell

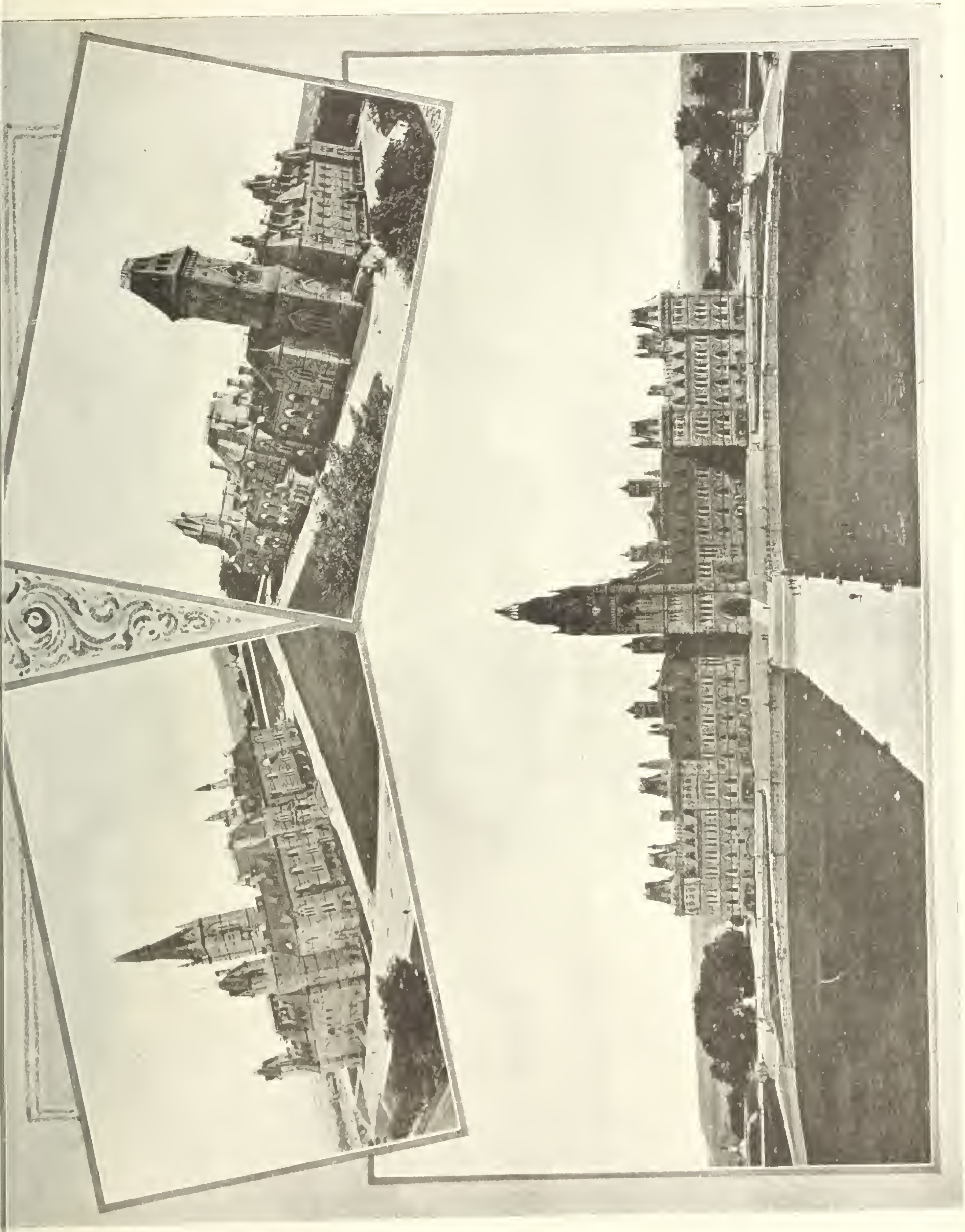
His Worship the Mayor of Ottawa, Mr. Charles Hopewell, was born in the district of South March, in the County of Carleton, Ont., in 1864. His career is of particular interest to readers of this journal in view of the fact that his avocation is that of a contractor and that he has been identified with many important undertakings in this field. Mr. Hopewell received his early education in the public schools and proceeded later to the Collegiate Institute of Ottawa. He was elected an alderman of Ottawa in 1900, retaining his seat against all comers until 1907. After serving for a time as Controller he became Ottawa's first magistrate in 1908 and has held the office continuously since that year. As we have said, Mr. Hopewell is a contractor, but he devotes practically all of his time to his civic duties.

In 1909 Mr. Hopewell was elected Vice-President of the Ontario Union of Municipalities and in 1910 he became President of that body. This year he was elected President of the Union of Canadian Municipalities. Upon the occasion of a recent visit to England he was elected a Non-Resident Fellow of the Royal Colonial Institute.

His Worship the Mayor—Mr. Charles Hopewell

As Mayor of Ottawa Mr. Hopewell is called upon to play a part in many exacting functions. One of the most important of these was his reception to Their Royal Highnesses the Duke and Duchess of Connaught upon their arrival in Canada in October, 1911.

His Worship is quiet, dignified, genial. And it need hardly be added that as a contractor of wide ex-



The Federal Parliament Buildings—the West and East Blocks above, and the House of Commons below perience he is peculiarly fitted to discharge creditably the administrative duties of his important office.

Mr. Herbert W. Baker—Publicity Commissioner

Mr. Baker enjoys the distinction of having been the first salaried Publicity Commissioner to devote his whole time and energies to municipal publicity in Western Canada. His experience in this line began with Mr. Edward Brown—ex-Liberal leader of Manitoba—during the latter's term of office as Mayor of Portage la Prairie, Man. Previously, Mr. Baker had filled the office of manager for an important Minneapolis grain concern at Portage la Prairie and on the Winnipeg Grain Exchange. He had continually "boosted" Portage la Prairie and the surrounding district in his daily advertising and when Portage la Prairie entered upon municipal publicity under the auspices of the Twenty Thousand Club and the Board of Trade, Mr. Baker was chosen to direct the work. During his tenure of office in the western town he was signally successful in the acquisition of new industries and the up-building of population. Mr. Baker was afterwards appointed Commissioner of Industries at Fort William, Ont., in which city concrete evidence of his labors may be seen in several thriving industrial establishments. At Fort William, Mr. Baker also filled the offices of Secretary of the Board of Trade, Secretary of the Parks Board, and Secretary of the Fifty Thousand Club. The Federal Capital was Mr. Baker's next charge. While his regime in that city has been a comparatively short one, he has been there long enough to show many tangible results of his work. It was Mr. Baker who organized a Greater Ottawa Association for the city as an auxiliary to the Publicity and Industrial Bureau. Ottawa may thank Mr. Baker and the progressive men identified with him in his work for a considerable share of her awakening in recent years.

The Publicity Commissioner—Mr. Herbert W. Baker

Complete statistics have been received from the manufacturers of cement covering their production and shipments during the year 1911. These returns show that the total quantity of cement made during the year, including both Portland and slag cement, was 5,677,539 barrels, as compared with 4,396,282 barrels in 1910, an increase of 1,281,257 barrels, or 20 per cent. The total quantity of Canadian Portland cement sold during the year was 5,636,950 barrels, as compared with 4,753,975 barrels in 1910, an increase of 881,975 barrels, or 18.5 per cent.

News of the Week from the Capital

(Special Correspondence of the Contract Record)

Ottawa, Sept. 27, 1912

THERE continues to be great activity in the constuctional field at Ottawa. Building operations are being rushed as quickly as possible so as to have the structures as near completion as possible before the frost sets in. On some of the buildings, and especially those being constructed of steel and concrete, gangs of men are working from break of day to dark.

Building Progress

The new Masonic Temple which is being erected on Metcalfe street for the Ottawa Masonic Temple Ltd., is making rapid progress, though a great deal of trouble was experienced in excavating the cellar (it being chiefly of blue clay) which had to be piled up with about three hundred piles. There was also some difficulty in securing the steel and brick tiling, but notwithstanding this the work has made fair progress, there being two storeys up and well on their way to completion. It is anticipated that from now on one storey a week will be erected, making it about six weeks before the concrete work will be finished. This structure is being rushed as quickly as possible as the concrete work must be completed before frost sets in.

The Machinery and Agricultural Hall, which is under construction at Lansdowne Park for the Central Canada Exhibition Association, is now having the steel-work of the roof completed. The building is 384 ft. long by 144 ft. wide, affording 55.300 square feet of floor space. The construction is of brick, steel and concrete. There are four broad entrances to the building, pillared on each side. The cost of the structure when completed will be $100.000. The building was designed by Mr. W. E. Noffke, of this city. Messrs. Alexander & Campbell are the contractors.

Progress on Engineering Structures

The construction of the Plaza Laurier at the junction of Wellington and Sparks street is not progressing as quickly as was expected and there is now little hope of having it finished by November 1st, the date set for its completion. The temporary tracks of the Ottawa Electric Railway Company on the west side of the Plaza, and connected with those on Sparks street by the new curves just put in, may remain in place until next spring as a result of this delay. These two curves are only about 50 feet apart and it is very difficult to handle the cars safely. A bad smash-up has already taken place there.

Bank Street High Level Bridge

Reference to this bridge was made in the Contract Record of April 24—chiefly with regard to its design and proposed method of construction. Cross-sections of the archings showed the system of reinforcing to be adopted and numerous sketches gave an idea of the general layout and ornamentation. The construction is now more than half completed. The north approach is built, along with three of the arches, and all the piers and foundations are in except the south abutment, which is well under way.

As the canal is emptied during the winter months it was possible to construct all the underwater piers during that period, thus doing away with the expense of having to cofferdam. By heating the water in the concrete mixer there was no trouble from frost, provided that the temperature was not below about 15 deg. above for that day, and that the concrete was well covered at night. All the piers rest on good sound gravel free from clay of any kind and are carried about five feet below the canal bottom.

Between fifty and eighty men are employed, the number varying with the particular work in hand. Two steam derricks and two Smith mixers are kept constantly at work. A larger plant than this would be impossible to manipulate on account of the lack of room at the site.

On concreting the arches the concrete already mixed is hoisted in the derrick-boxes to a temporary platform above the arch and there emptied from it into wooden flumes which carry it to its place. Constant inspection is required to see that all the reinforcing is properly held in place during concreting. There are many devices for doing this. A 1:2:4 broken stone mixture is being used for all arch rings, while a 1:3:6 gravel mixture is being used in the piers up to the springing line, and in all walls and abutments.

Unless contingencies of an unforseen nature develop, the structure should be completed by May of 1913 at the latest. Allowance will have to be made for letting all the fill get well aerated and set before any paving is laid. Conduits are going to be placed under the sidewalks for the electric companies use, this being done wherever possible in all new work, more or less as a stepping-stone to doing away with all unsightly telegraph poles in the future.

When this bridge is completed boats will have thirty feet clearance in height above high water under the main arch. This should accommodate any boat using the canal.

This new crossing will considerably help the development of Ottawa South as it will enable the electric railway to cross the canal at this point. This they have been wanting to do for some time as the traffic along Bank street to Ottawa South is so very heavy, in fact the heaviest in the city. The new bridge is badly needed as the old swing span was quite inadequate—to say nothing of the constant delay and congestion of traffic due to passing barges and boats.

Rideau Street Hill Paving

This street is at present being paved with wood and scoria blocks. The work is being done by day labor. The roadway had to be carefully treated as the ground is always in a very saturated condition. Tile drains were first laid to try and alleviate this difficulty, the excavations being well rammed back in the trenches. The wood blocks will be laid from Charlotte street past the two hospitals, the Protestant and Maternity, and the scoria blocks from the Maternity to Cummings Bridge. Two gangs of men are employed and it is hoped to have the work completed by the end of October. This is the first stretch of roadway paved with wood blocks this year. It was undertaken with a view to deadening the noise of vehicles passing the hospitals. The roadway will be 39 feet wide and will have an 8-inch crown.

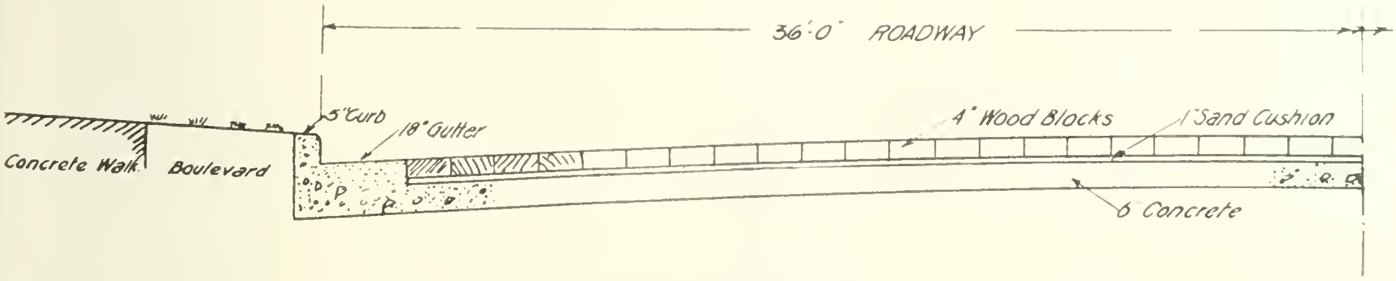


Diagram of Rideau Street Hill pavement

Buildings Under Design

Draft plans are being prepared for a new athletic club-house to be erected in a central part of the city. It is planned to have a swimming bath, gymnasium, living apartments for members, bowling alleys, and all the requisites for a modern club, modelled along the lines of the Montreal Amateur Athletic Association. The proposed club-house will cost in the neighborhood of $120,000 and will accommodate about five hundred members. It will be about six storeys high.

The City Council will consider shortly the recommendation of their food inspector to erect a civic abattoir in Ottawa. This is almost a necessity for the proper handling of the meat supply. In all likelihood plans will be drafted immediately.

Plans have been prepared by Mr. Frank C. Sullivan for a modern covered market, which it is proposed to erect on Plouffe Park, at the corner of Somerset and Preston streets. The market committee will consider the plans at an early date.

A site has been purchased and plans are being prepared for the erection of a new factory building for Messrs. McKenzie, Limited, contractors for railway and lumbermen's supplies. This is an incorporation of McKenzie & Company. Mr. J. A. McKenzie is the vice-president and managing director.

Water Supply

Mr. Allen Hazen, the New York water expert engaged by the city to plan the new filtration plant, submitted a report to the council as to the site for the new works. He declares emphatically that Lemieux Island is the ideal location for the plant if the Ottawa River is the location for the supply, but he still favors the McGregor Lakes if the factor of expense is not to be considered. Three methods of carrying the pure water pipe from Lemieux Island through the dreaded Nepean Bay to the pumphouse will be considered by him. These are as follows: (1) steel pipe in rock trench below shallow water, work to be done in coffer dam and pipes surrounded by concrete; (2) rock tunnel at a greater depth, and lined with concrete; (3) steel pipes laid in trench on land where the route permits, surrounded by concrete and otherwise protected. Borings will be made soon to find the character of the strata which will be encountered. Mr. Hazen hopes to have his plans (preliminary) laid before the Provincial Health Authorities for their approval within six weeks.

L. H.

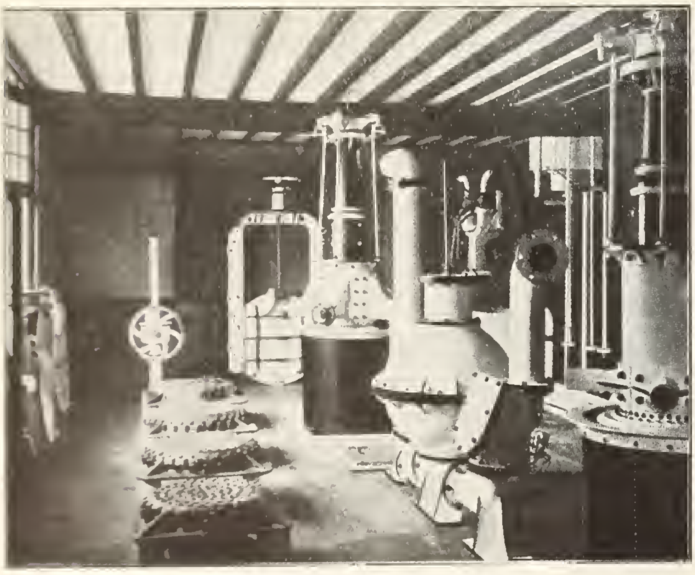
The picturesque town of Douglas, Isle of Man, where the whole of the low level sewage is raised automatically and without annual cost by means of Adams' sewage lifts

Cheap Sewage Lifting

Our London, Eng., correspondent reports an interesting interview with Mr. S. H. Adams, A.M.I.C.E., the well-known sewage disposal expert who designed and patented the apparatus now known as the "Adamic" Patent Sewage Lift.

In recalling the facts in connection with pumping sewage or other liquids, which pointed out to him the need for his invention, Mr. Adams said:

"It often happens that the sewage of a low level district has to be raised, and pumping plant is installed to do the work at an annual cost, more or less heavy, and with the certain knowledge that this plant must ultimately be entirely renewed. There is, therefore, the first cost of the plant, the cost of the fuel and attendance, cost of repairs, and finally the cost of an entirely new plant to replace the one which is worn out. It is also customary to put down pumping machinery in duplicate, so that in the event of a break-down, one half shall be operative.



A portion of the Adams Hydraulics show room at York, Eng.

"With the 'Adamic' lift, if the conditions are favorable, the work of lifting is done by means of the sewage itself, and thus without cost (save that of installing the plant). The apparatus is as permanent as the iron-work of the sewers and when once put down requires no replacement and practically no attention other than the occasional inspection of the ordinary sewer-man. These lifts are entirely noiseless and give off no offensive gases. The 'Adamic' lift consists of an automatic flush tank, two cast iron cylinders and air connecting pipes. The only moving part employed is a plain flap valve, as opposed to the hundreds of parts of an ordinary pumping plant. In scores of English towns, there are installations of this lift working day and night without attention, and it has been estimated by users that, on account of no fuel, attendance, or repairs being needed, the plant returns its own cost in three or four years."

Mr. Adams showed our correspondent a number of photographs which his firm exhibited at their stand at the recent Exhibition at York.

The first was that of the sea-front at Douglas, Isle of Man, where the whole of the low level sewage is raised automatically without cost by the Adams' Lifts, which gain their power from the sewage off the hills at the back of the Bay. Nothing whatever is visible above ground, the various chambers being built below the roadway. These lifts have a combined discharging capacity of one million gallons a day, and taking one-quarter as the average volume lifted a day, the saving effected by the use of the apparatus at 2d (4c.) per thousand gallons may be estimated at about £700 ($3,500) per annum. The engineers for this work were Messrs. Stevenson & Burstall, of Westminster, London, S.W.

In July of this year, Mr. Adams received a letter from the Corporation of Douglas congratulating him on the unqualified success of the nine years working of his lifts in their city. The letter concluded:

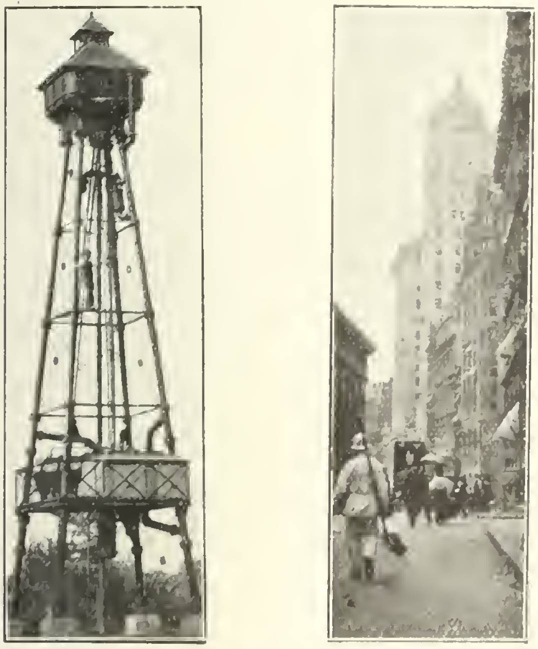
"The lifts have worked with wonderful regularity and with practically no cost other than the necessary attention to the cleaning of the sewers. The system has been an unqualified success and has borne out the contentions of the engineers who recommended the adoption of the scheme."

Another of the photographs showed an Adams' lift working under different conditions at Exminster, the engineer for the work being Mr. Sidney R. Lowcock, of Westminster. In this case the flush tank is above the ground and the high level sewage is brought to it by an inverted syphon. For a considerable distance all the surrounding neighborhood is of a very flat nature. The lift pumps the sewage

Belfast Convenience where the Adams lift is installed (about 4,000 gallons an hour) from the low-lying area directly up into the sewage outfall works.

The next photograph showed the lift again under different conditions at the new Underground Convenience in Donegall Square, Belfast. The discharge level of the drain is below the gravitating sewer. The difficulty of lifting is overcome by an Adams' lift. The lamp column is a flush tank fed by the town's water supply. This tank discharges at regular intervals and supplies the compressed air needed for ejecting the sewage to the required level. After use thus, the water from the flush tank is carried to a storage tank and from thence used to supply the different sanitary fittings.

The last illustration was a small photograph (taken by Mr. S. H. Adams) of Commercial Cable Building, New York. In the sub-basement of this structure there is an Adams' patent lift which for many years has been continually raising the sewage from the basement lavatories to the main sewer of the street. It is of this apparatus that the engineer-in-charge said in a letter to Messrs. Adams during the present year: "It has stood a severe test and has gone along and performed its work without hindrance or trouble to us, and I think it is as near a fool-proof appliance as can be constructed."



Interesting installations at Exminster, Eng., (on the left) and at the Commercial Cable Building, New York City, (on the right.) See text.

The Canadian member of this firm is Mr. Colin H. Adams (son of Mr. S. H. Adams), who served a long and valuable apprenticeship with his firm in England before coming over to Canada. During that time he was on many of the largest sewerage works in the world, including the big installation in Douglas.

Switzerland Electrifying Steam Roads

The electrifying of the entire system of government railways in Switzerland is a question that has been occupying the attention of the Federal Council for several years. The fact that Switzerland produces no coal makes the cost of fuel for operating steam roads an important item in government expenditures, and the further fact that the mountain streams make available a vast amount of water power for the generation of electricity, has encouraged the serious consideration of the proposition to electrify the railways. Water power in Switzerland is under government control. Several commissions have been appointed to investigate and report upon the practicability of the scheme, and the most feasible plan of changing the system. After a thorough investigation of the subject and some experiments, the commission has reported in favor of single-phase alternating current at 15,000 volts pressure. The first work to be undertaken in the application of electricity for propelling power in the state railways will be in the St. Gotthard route, where there are many steep grades and numerous tunnels, the longest of which is over nine miles. The change is especially desirable on this line as it will eliminate the disagreeable passage through many long tunnels filled with smoke.

It is estimated that the cost of the conversion of the entire government system, aggregating 1,700 miles, will be something like $14,000,000, including water power for electrical generation, while the cost of operation would be reduced about 10 per cent. as compared with steam power. The recent opening of the Loetschberg tunnel, which is over nine miles long, establishes a new and important traffic outlet for Switzerland. It shortens the distance between London and Milan and other points in northern Italy by several hours, and when completed and equipped with electric motive power according to the plans, will prove an important branch of the transportation system of the Confederation.

The Kearney High Speed Railway

One Hundred Miles an hour Commercially Economical

Office of the Contract Record,
3 Regent St., London, Eng., Sept. 20, 1912.

Your correspondent recently called upon Mr. Elfric W. Chalmers Kearney at his Oxford street address where he has a most efficient model of a high-speed mono-railway laid out. Mr. Kearney gave a most interesting demonstration.

The cars are 44 inches long over bumpers and are constructed on a scale of ¾ inch to the foot. The bearing wheels are all drivers and are each three inches in diameter. There is a motor of one-tenth h.p. on each bogie, the transmission to the wheels being effected by chains. The motors and driving wheels are all mounted on ball bearings.

The track is 110 feet long and the station at each end is on a higher level. The difference of level between the station and the bottom of the gradients of 33 1/3 per cent. is 4 feet. This drop of four feet gives a speed of 10 miles an hour, due to acceleration by gravity at the rate of a little over ten feet per second. These gradients, Mr. Kearney remarked, are rather more than twice as steep as are intended for full-sized railways.

From a switchboard close at hand Mr. Kearney caused a train to commence moving out from a station. It ran down the gradient with a dead smooth glide, gathering velocity meanwhile, flashed across the floor of the large room at a speed of thirty-two miles an hour, and mounted the opposite gradient at a steadily decreasing pace until it pulled up very gently in the next station. In running into this station it automatically operated points which had hitherto made it impossible for another train to run down that line until it had passed by. Mechanism controlling red and green signal lamps is interlocked with that which operates the points.

Mr. Kearney pointed out to me that the cars are equipped with self-acting track brakes which come into operation immediately on arrival at the station after the current has been automatically switched off; and that the cars are also self-reversing at the ends of the lines.

It is worth noting that the speed attainable on a similar scale model railway of the ordinary type is about four miles an hour, and it is customary amongst model makers to multiply this speed by the scale in order to arrive at the proportional speed. A one-sixteenth scale model which travels at an actual speed of four miles an hour is said to be going at a "proportional" speed of 4 x 16, equalling 64 miles an hour.

The same basis of calculation applied to the Kearney one-sixteenth scale model gives at the very least 500 miles an hour proportional speed—although it is not proposed as yet to run full-sized Kearney trains at more than one-fifth this rate, namely, 100 miles an hour.

A Kearney High-Speed Railway at the Riviera

In speaking of his commercial plans, Mr. Kearney said that as a result of negotiations extending over several years, a valuable concession had been obtained for a railway to be built on the Kearney high-speed system between Nice and Monte Carlo. The times required by the new high-speed line and the existing facilities are:

Kearney High-Speed	20 min.
Steam railway expresses	35 min.
Electric tramways	75 min.

The present traffic amounts to over two and a half million passengers per annum, and the distance is eleven miles.

The high-speed line will start from Nice as a gravity tube railway and will continue so to the outskirts of the town—a distance of one and a quarter miles .Then for nine miles the line will be a surface railway, following as far as possible the contour of the country, and will once more enter a tube at a point three-quarters of a mile from the Monte Carlo terminus.

The nine miles of surface railway is to be constructed with a double line of Kearney track at a cost of thirty per cent. less than that for a single standard line. A responsible French railway contractor has tendered for the construction, and the above figures are based on the tenders submitted. The Kearney system, in this instance, with a double track, shows a saving in track construction of over £5,000 per mile compared with a single track of standard railway.

The underground portions of the new line will be built on the Kearney Gravity Mono-Tube system, which will save fifty per cent. in capital cost on these sections, and reduce the power consumption for working by over eighty per cent. compared with an ordinary underground railway.

Mr. Kearney said he anticipated that the first section of this railway would be ready for traffic before the end of 1913. "And then," he concluded, "my ideas will have at least five times as great a market value as they have now."

The Pollution of Boundary Waters

The Governments of Canada and the United States have referred to the International Joint Commission the question of the pollution of boundary waters. The following questions have been laid before the Commission, which is now holding its regular fall meeting at Ottawa:

"1. To what extent and by what causes and in what localities have the boundary waters between the United States and Canada been polluted so as to be injurious to the public health and unfit for domestic or other uses?

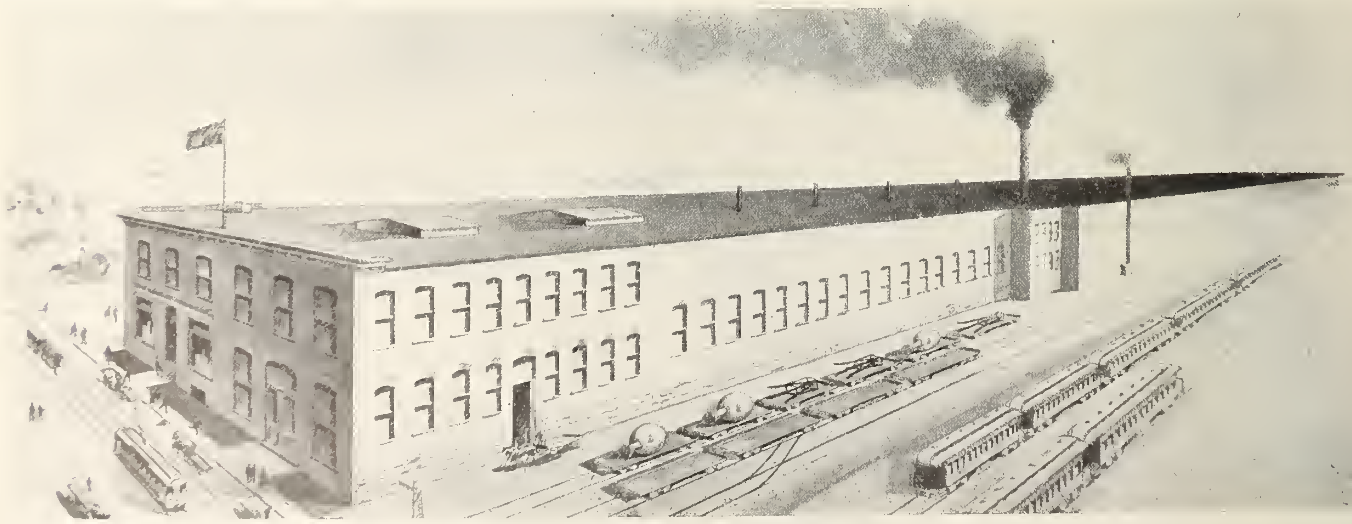
"2. In what manner, whether by the construction and operation of suitable drainage canals or plants at convenient points or otherwise, is it advisable to remedy or prevent the pollution of these waters and by what means or arrangement can the proper construction or operation of remedial or preventative works, or a system or method or rendering these waters sanitary and suitable for domestic and other uses, be best secured and maintained in order to insure the adequate protection and development of all interests involved on both sides of the boundary, and to fulfil the obligations undertaken in Article IV. of the Waterways Treaty of January 11, 1909, between the United States and Great Britain, in which it is agreed that the waters therein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other?"

A Flourishing Ottawa Industry

The accompanying illustration is a view of the plant of the International Marine Signal Company, Ottawa, organibed in 1906 to manufacture the Wilson automatic acetylene gas buoys and beacons. These aids to navigation are the invention of Thomas L. Willson, of Ottawa, who was also the discoverer of the electro-chemical process now used extensively in the manufacture of calcium carbide.

The buoys and beacons of the International Marine Signal Company are now used in various parts of the world, including Great Britain, the United States, Canada, Italy, Austria, Australia, India, etc.

As well as the buoys and beacons mentioned above the International Marine Signal Company have departments devoted to the manufacture of boilers, tanks (riveted or welded), cranes (hand and power driven), and flare lights. They are also equipped to fabricate and erect structural steel in its various branches and carry a large stock at all times.



The International Marine Signal Company's extensive plant at Ottawa

Mainly Constructional

The News in Brief—From the Atlantic to the Pacific.

Messrs. Perrault & Hague have registered as contractors in Montreal.

The Union Supply Company have registered in Montreal as dealers in contractors' supplies.

The Superior Brick Company, with a capital of $500,000, has been organized to manufacture brick and tile at Fort William.

A street railway system is to be constructed at Three Rivers, P.Q. For the present 5½ miles will be built within the city limits.

Messrs. Willows & Williams, builders and contractors, who constructed the big C. N. R. hotel and depot at Brandon, have located in that city.

A site has been selected and plans are to be prepared for the proposed new municipal building at the Forest City. The cost of the building is placed at $250,000.

The Civic Works Committee, Toronto, after much discussion, decided to widen Terauley street from Queen St. to Davenport Road to 66 feet. The estimated cost is $600,000.

The corner-stone of the new Knox College, Toronto, was laid by Sir John Gibson on September 26th. The total cost of the buildings is estimated at half a million dollars.

S. M. Brookfield & Co., Ltd., of Halifax, N.S., have an important contract in the erection of the one million dollar sugar refinery at Woodside, N.S., for the Acadia Sugar Refineries.

Canora is to have a $40,000 hospital which is to be donated by Mrs. Waddell, of Peterboro, Ont. The building will be 80 by 45 feet, and will have three storeys and a basement.

At a meeting of the directors of the Y. M. C. A., Moose Jaw, it was unanimously decided that there was great need for a new building. Steps will be taken to provide the necessary funds.

Citizens of Vancouver are asked to donate $60,000 for a new building for the Seamen's Mission, the present structure being quite inadequate to accommodate the sailors who come to that port.

Moose Jaw citizens are feeling anxiety as to the safety of the King George school in that city. Part of the ceiling on the second floor has collapsed, and a test is to be conducted at the city's expense.

Only about half of the dredging work to be done in the St. John River has been accomplished up to the present and it is doubtful if the balance can be completed before navigation closes this season.

Building operations in Hamilton are seriously handicapped by the scarcity of labor and material but in spite of these drawbacks the permits for the year show that the four million dollar mark has been passed.

The Imperial Construction Company, of Toronto, are the contractors for a large new residence for Mr. A. R. Davidson, Fort Rouge. The house is being built of white stone and will cost, when completed, over $100,000.

There is a movement on foot in Winnipeg, backed by the architects of that city, to enlarge the city hall square so that the new building, for which the plans are now drawn, may be placed to better advantage. Mr. Leonard Stokes, ex-president of the Royal Institute of British architects, who is at present in the city, has had this question placed before him and the final selection of the plans has been left to his judgment.

It is anticipated that work on the new million dollar hotel for St. John, N.B., will be commenced about Christmas. The hotel will be situated on Prince William street, facing the custom house, and will be six storeys high, with basement.

The York County Good Roads Commission have no intention of moderating their plans, although the cost has somewhat exceeded the original estimate. There are now more than sufficient funds on hand to carry on the work for the balance of the season.

The demand for building permits in London is very large and it is anticipated that the total for the year will exceed a million dollars, which was the high-water mark for 1911. So far the figures for this year are considerably higher than for the same period last year.

The city of Hamilton, Ont., is thinking of abandoning its present east end sewage disposal plant and of building a new one. The ratepayers will be asked next January to vote on a by-law authorizing the construction of a trunk sewerage system at a cost of $500,000.

Building permits in Calgary for 1912 now exceed in number and amount the total for the year 1911. A conservative estimate places the ultimate total for 1912 at $18,000,000. Ratepayers have authorized the issuing of $378,000 debentures for waterworks extensions.

The contract for the erection of a $50,000 apartment house at the corner of Granville and Fourteenth streets, Vancouver, was awarded last week to Mr. J. F. Langer. Messrs. Braunton & Leibert are the architects for this building, which is being erected for Mr. L. C. Marshal.

Among the new incorporations are the Paris Brick and Clay Company, Limited, with a capital of $100,000 and head office at Brantford; the Guelph Brick and Tile Company, Limited, with headquarters at Guelph, and a capital of $50,000; and the Thor Iron Works, Limited, of Toronto, with a capital of $100,000

Everything is now ready for the foundations of the new million bushel elevator which the C. P. R. are building at St. John. The elevator will be built of reinforced concrete and construction will be commenced as soon as the foundations are laid. Messrs. J. S. Metcalf & Company, of Montreal, are the contractors.

A new road is to be constructed from St. Lambert to Beloeil, P.Q., and the Montreal & Southern Counties Railway Company will build an electric line on this new highway. The road will parallel the Grand Trunk Railway tracks until it reaches St. Hubert, and will then run across country—a total distance of 15 miles.

The Daly & Hannan Dredging Company, of Prescott, Ont., is being absorbed by the Norton-Griffiths Company, which is building the Courtenay Bay drydock. Mr. Daly, it is understood, has retired, and Mr. Hannan, of Ogdensburg, and Mr. Duncan McMartin, of Montreal, are the men who have joined the Norton-Griffiths Company.

Work has been completed on the temporary prison farm for the Provincial Government at Burnaby, B.C. The building is of frame construction, 120 by 160 feet, and has grilled steel cells to accommodate 200 prisoners. The permanent building which will be completed in about two years, will have accommodation for over 600 prisoners.

The H. W. Johns Manville Company, of New York, are establishing a special department of waterproofing. The department will be managed by Mr. W. H. Lawrence, an expert waterproofing engineer, who will consult with architects and engineers as to the best method of applying waterproofing and mastic material for all purposes. The com pany have branch offices in all the principal cities in Canada and the United States. Their lines are too well known to require enumeration.

It is reported that Messrs. Fraser, Brace & Company have entered an action against the Canadian Light & Power Company and J. G. White & Company in connection with the construction of the Canadian Light & Power Company's plant at Beauharnois. The sum claimed is $69,532, and is for work relating to the Valleyfield end of the Beauharnois canal.

Inadequate publicity and an insufficient time limit have made it necessary for the Winnipeg Board of Control to extend the time for competitive plans for their proposed new three million dollar City Hall. An extra three months' grace has been allowed, the date for receiving preliminary designs having been changed from November 11 to February 15.

Messrs. Allis-Chalmers-Bullock, Ltd., Montreal, have secured contracts for two municipal lighting and power systems at St. Jerome, P. Q., and Grand'Mere, P. Q., the engineers for both being Messrs. Surveyor & Frigon, of Montreal. The hydro-electric power plant for St. Jerome will be situated on the North River, and for Grand'Mere on the Shawinigan River.

Building permits for the year in Winnipeg are more than two millions short of the figure set for the 1912 mark, but if a fair average for the next two months is maintained there seems no reason why they should not reach $20,000,000 before January 1, 1913. There are a number of buildings in sight, though unless they are commenced shortly little more than the foundation will be attempted this year.

Excavation work has started on the site of the $300,000 theatre building that will be erected in the rear of the Elysian hotel, Vancouver. It will have a seating capacity of 1600 persons, and will be part of a one hundred-room addition to the Elysian hotel. Work on the building, which will be of steel and reinforced concrete construction, will be rushed so that it will be ready for occupation by March 1, 1913.

After visiting Van Horne street and the vicinity the members of the Works Committee, Toronto, have decided to abandon the proposition to extend the thoroughfare to Royce avenue. The Assessment Department reported that the proposal would cost $300,000 in land damages to the railway company's property as the plan for extension necessitated cutting the road through the centre premises, which would render the property useless.

The absorption of the Laprairie Brick Company by the National Brick Company, Montreal, was followed by a bitter fight, owing to the clash of interests. Messrs. T. A. Trenholme and Paul Galibert, of Montreal, who were at one time directors of the Laprairie Company, standing out for what they considered the minority rights. A settlement has now been reached, the two gentlemen named having come to terms with the National Brick Company as represented by Mr. W. Lyall.

The registration bill for architects which was discussed at the recent meeting of the B. C. Society of Architects in Victoria, has been further advanced by a meeting held in Vancouver, at which the Vancouver and Victoria chapters were represented. The draft bill for submission to the next session of the legislature was approved, while another matter which came before the conference was a by-law to regulate the profession in the province. It is practically a code of ethics for the members of the profession, regulating professional charges and contracts.

Sir Percy Gironard and Mr. J. P. Davidson, both of the firm of Sir William Armstrong & Company, after inspecting the Courtenay Bay development works, expressed surprise at the expenditure of such a large sum of money for carrying on development work in so restricted a space as the present scene of the works. They were both of the opinion that the breakwater should have been constructed farther down the bay. They say that after the work is completed it will be impossible for ships of the size of the Mauretania and Lusitania to manoeuvre comfortably inside the breakwater.

Mr. F. W. Simon, of Liverpool, England, is the architect whose plans for the new provincial Parliament Buildings in Winnipeg have been selected by the government. The announcement follows a meeting of the committee appointed at the last session of the Legislature to pass finally on the different plans admitted. It is estimated that the buildings will cost in the neighborhood of $2,000,000, and that excavation work will be completed this Fall. Mr. Simon wins the first prize of $10,000, besides commissions which will reach $100,000. The remaining four placed competitors get $2,000 each.

About two hundred workmen are now employed on the head-race of the Cedar Rapids power plant, just outside Montreal. The company, which is doing the work itself, is controlled by the Montreal Light, Heat and Power Company and the Shawinigan Water and Power Company, and the project will be one of the largest in the country. Several steam shovels have been at work for some time, a considerable portion of track has been laid, locomotives have been bought, and work generally is now being carried on with activity. The wall to parallel the shore at the foot of which the great power house is to be constructed has been commenced.

The city of Victoria is asking for tenders for the construction of the Ogden Point breakwater, which is to extend 2,500 feet in a southwesterly direction to enclose an outer harbor, sheltering five concrete piers. Many firms have entered into the bidding for this important work. Among them are Sir John Jackson & Company, who have a record of having built more breakwaters and harbor works than any other firm in this line of business in the world; Norton Griffiths, Ltd., which firm is constructing the harbor works at St. John; Sir W. Pearson & Company, Haney & Miller, and others. Tenders for the work will be received at Ottawa until October 15.

Canadian and British architects are to be invited to submit plans for a new departmental building or group of buildings at Ottawa, to be constructed along the bank of the Ottawa River west of the Parliament Buildings. The land has been acquired by the government and the former owners are now being settled with by agreement or arbitration. The late government was about to erect an office building on Sussex street but before a contract could be let, they lost authority to close the bargain. Some years ago, the Liberal Government had a competition among architects for a departmental building. The prizes ran up to the thousands, and most of the architects of Canada competed, but the results were disappointing. It is probable that the first prize will be twenty-five thousand dollars and the competition will be limited to architects and architectural firms of Canada and Great Britain.

An inspection of the great dam at Coquitlam, B.C., which was described in detail in our issue of June 21, 1912, was made recently on behalf of the Dominion Government by Mr. J. R. Freeman. The engineer found that rapid progress had been made in the great undertaking and praised the manner in which the company's engineers were constructing a dam which he believes will be one of the safest and best on the continent. Mr. Freeman stated that the rock toes of the dam would be most stable, the heavy rock used for this part of the work making this section of the dam equal to any in the world. The engineer also made a close inspection of the various camps of the company about Lake Coquitlam, and stated that the sanitary conditions prevailing were the best he had seen. He was greatly impressed with the magnificent water works intake tower which the company has provided for New Westminster. The work in connection with Lake Coquitlam dam is being carried out under the direction of Mr. G. R. G. Conway, M. I. C. E., chief engineer of the Vancouver Power Company, with Mr. Fleming Ramsaur as resident engineer in charge of the work, and Mr. George Albert, a well known Californian hydraulical expert, in charge of the sluicing operations. The work at the lake has given employment during the height of the season now closing to upwards of 1000 men. At the present time a force of about eight hundred men is engaged on the undertaking.

Trade Conditions at Edmonton

Architects and contractors report there is every indication that the $13,000,000 mark will be passed this year at Edmonton, Alta., which means an increase of about 256 per cent. over 1911. They say also that 1913 will show substantial gains over this year, taking into consideration the structures projected and to be erected within the next fifteen months. The $10,000,000 mark was passed in August, when 343 permits, involving an aggregate expenditure of $10,250,467, were issued. The figures for the first eight months of 1911 show buildings of a total value of $3,126,413; for the same period in 1910 they were $1,650,692.

House builders report that they are at least two years behind, partly due to the lack of materials and skilled workmen, but chiefly as the result of the large influx of population. More than 2,700 persons are living in tents outside of the fire limits.

"While several local companies are engaged in the business of building houses for dwelling purposes," said Mr George M. Hall, industrial commissioner of the municipality, "there is room in Edmonton for concerns possessed of large capital to engage in house building upon an extensive scale. Edmonton needs fully 2,500 four to six-roomed houses, which could be built and sold at a good profit on the investment."

Mr. William Gordon, a pioneer of the north country, while in Edmonton a few days ago, reported the establishment of two sawmills at Fort McMurray, Alta. He is confident that a big building boom will follow next spring. Fort McMurray is a new town at the confluence of the Clearwater and the Athabasca rivers and is the third gateway to the western part of the Dominion.

Figures given out by the Federal Census Department at Ottawa show that Edmonton has forty manufacturing establishments, capitalized at $3,816,120, employing 1,560 hands, who are paid $1,004,724 in wages and putting out $1,193,304 worth of finished products.

Mr. C. A. Ross, of Messrs. Ross & McFarlane, of Montreal and Winnipeg, architects for the Grand Trunk Pacific Railway Company's hotel to be erected in Edmonton at a cost of $1,250,000, was recently in Edmonton conferring with officials of the Canadian Stewart Company, who have the building contracts. Excavating for the foundation has been started and it is announced that the structure will be ready for occupancy within fourteen months

Toronto is to have a central dock, capable of accommodating the largest vessels navigating the St Lawrence river. The plant for such a dock are now under consideration by the Harbor board, but the details as to the position and nature of the wharf will not be made public until all of the plans are completed The fact that such a dock is to be constructed will be welcome news to outside shippers, and will be of great commercial advantage.

Canadian Railroad Development

The Canadian Pacific Railway has awarded a contract to Grant Smith and McDonnell, Spokane, Wash., for double track work between Hammond, B.C., and Ruby Creek.

Messrs. Guthrie-McDongal & Company, Portland, Ore., have been awarded the contract for forty-two miles of line for the Great Northern Railway west from Coalmont, B.C

Owing to growth of business the C. P. R. find it necessary to increase their yard space at St. John, N.B., and also to add a two-storey extension to their present office building in West street.

Before the present year is out operations will be started at the Leaside site on the new Canadian Northern shops for the Toronto district. Eight hundred men will be employed in these shops at the outset.

It is stated that the tourist travel through the Canadian Rockies and the Selkirks surpasses all previous records. Since the opening of the season no less than 30,000 visitors registered at the C. P. R. hotel at Banff.

The work of grading the C. P. R. roadbed at Belleville Junction with the C. N. O. Railway, near St. James Cemetery, to Bayside, is almost completed, and good progress is being made between Bayside and Trenton.

Mr. C. E. E. Ussher, passenger traffic manager of the Canadian Pacific Railway, has returned from his tour of inspection over the system to the Pacific coast. He declares that the conditions in the West were never better.

Work is proceeding on the new railroad entrance in the north end of Toronto and already considerable progress has been made in the elevations of the tracks of the C. N. R. and C. P. R. between Avenue Road and Yonge street.

Foley, Welch & Stewart, of Spokane, Wash., Vancouver, B.C., and St. Paul, Minn., have been awarded the contract for the construction of the new line from Vancouver, B.C., to Fort George, a distance of 318 miles. The new road will cost about $16,500,000.

The immediate construction of a branch of the E. & N Railway from McBride Junction to Courtenay has been decided upon. This line will run along the coast for forty-five miles and will give a through connection by rail from Victoria to Union Bay and Courtenay.

It is reported that the Canadian Northern Railway have just purchased a property on Ashley avenue, North Rosedale, at the point where the C. P. R. viaduct crosses the old belt line ravine, and that the land will be used for bridge approaches, landings and right of way for the line to North Toronto.

Work on the new C. P. R. line from Bruderheim to Vermillion, Alta., will be started immediately and it is hoped to connect up fifteen miles of the grade from Bruderheim before the close of the construction season The provincial legislature are guaranteeing two hundred miles of this line at $13,000 a mile

Considerable progress has been made in the negotiations now pending between the city of Vancouver and the Canadian Northern Railway with respect to the utilization of the bed of False Creek for terminal facilities, and many of the concessions asked for were formally acceded to by Colonel Davidson on behalf of the company Another conference will be held shortly

The Northern Terminal Railway Company which holds a charter from the Dominion Government to build and operate a line through almost the same territory as the Alberta, Peace River & Eastern Railway Company, is a ranging to send out surveying parties as soon as instructions are received from London, Eng., where the railway is being financed.

The Canadian Northern Railway Company have filed plans with the Dominion Railway Board for a new high level bridge over the Humber River at Lambton. The bridge will be similar in style to the C. P. R. structure at that point and will be located immediately to the south. It will be a steel structure with concrete bases in the water like the C. P. R bridge. Only one track is shown, but possibly provision will be made for two.

While the ultimate choice of route for the Pacific Coast Eastern from North Vancouver to the Grand Trunk Pacific main line in the heart of British Columbia has not yet been officially announced, it is now understood that it will run in a general way along the shore of Howe Sound and the Squamish Valley, through the rich Pemberton Meadows, on the way to Lillooet and the further route up the Fraser River, and will in this district open up an agricultural country unsurpassed by any in the province.

Engineers working on the proposed route of the Canadian Pacific between Metaline Falls and Trail, B.C., have secured an easy grade between Metaline Falls and the International boundary, a distance of ten and one-half miles, although the construction will require about eleven tunnels. The engineers are now proceeding from the boundary to Trail, a distance of thirty miles. It is estimated that the cost of this new line will be about $1,000,000. Mr. J. G. Sullivan, Winnipeg, Man., is Chief Engineer.

The Lake Erie & Northern Railway Company will complete surveys in about thirty days, and expects to let construction contracts about that time for its projected line. The road is to be 53 miles long, and its route will be from Port Dover north through Simcoe, Brantford and Paris to Galt, connecting there with the Canadian Pacific. The capital for construction has been secured. Mr. John Muir, Brantford, Ont., is President, and Mr. Wm. P. Kellett, Brantford, Chief Engineer and General Manager.

It is announced that the Canadian Northern Railway tunnel connecting the city of Montreal with the C. N. R. model city, Mount Royal, will be open for traffic by August of next year. This will make the phenomenal record of the completion of a three and a third miles of tunnel within a year after the work was commenced. The rate of work has been increased until now the length of tunnel is growing at the rate of eighty feet per day. As soon as the hard rock is found on the city side of the mountain, the rate on that side will be increased twenty feet a day as well.

Owing to a strike of the rivetters, the work on the C. P. R. bridge at Lachine, P.Q., was interrupted for a short time, but now that the dispute has been settled, work has been recommended on the first span, one of the four to be erected. As soon as the two spans of 408 feet each are in place the first side of the bridge will be completed, and the traffic will be switched to that side, so that the work of dismantling the old portion, which is still standing, to make way for the remaining two 408-feet spans can be proceeded with. The total cost of the work will be three million dollars.

A smokestack two hundred feet high will be one of the features of the large power house which the Canadian Pacific Railway has planned as an adjunct to the new hotel which the company is building at Calgary. The new power house and smokestack will be located just west of the old boiler house on Tenth avenue, and will be connected with the hotel by a tunnel six hundred feet long. Excavation work has already commenced for the tunnel and for the base of the huge smokestack. The tunnel will be seven feet high and ten feet wide. The smokestack, which will furnish draft for the huge power plant to be installed, will be nineteen feet in diameter at the base, and at the summit eight feet.

An Edmonton despatch states that 120 miles of steel on the Edmonton, Dunvegan and British Columbia Railway will be laid this season, affording connection with Athabaska Landing north of the Albertan capital, the grade over this section being already complete. A track laying machine, capable of covering a mile a day, will begin work shortly and continue operations to the Peace River. The company has a site of 142 acres for terminal purposes in Edmonton and will use, for its passenger traffic, the union station to be erected by the Grand Trunk Pacific Railway at a cost of $400,000.

Mr. H. G. Kelly, Vice-President of the Grand Trunk Railway, exprcsses the opinion that the city council of Toronto is responsible for the delay in the construction of the new Union Station. He stated recently that the C.P.R. desired some change in the plans and that, instead of allowing the two companies to reach some amicable agreement in this matter, the city council showed impatience and filed another application before the Dominion Railway Board. The work on the new station and bridge at Sunnyside is being delayed for want of steel, but it is expected to resume building operations very shortly.

Engineers and surveyors in the employ of the Alberta, Peace River & Eastern Railway Company, which purposes building a new transcontinental line from Hudson Bay to the Pacific coast by way of Edmonton, have started from Edmonton on a trip of more than 2,000 miles into the north country to survey the route. Mr. H. M. King, head of the London & Dominion Trust Company, and President of the railroad company, who is in England completing the financial arrangements for the system, is expected in Edmonton in a short time, when other important announcements will be made in connection with the undertaking.

The construction of the new Montreal passenger station of the Canadian Northern Railway, which is to be erected at a cost of several million dollars, and which will be without doubt the finest railway station in the Dominion, is to be commenced as soon as the snow is off the ground next spring. Sir Donald Mann, vice-president of the Canadian Northern Railway, who has been in Montreal in connection with the C. N. R. projects there, made the above statement. It is intended to have the new station completed and ready for use at the same time as the completion of the C. N. R. transcontinental, which Sir Donald states will be laid by the fall of 1914. This, and the completion of the tunnel under Montreal mountain, connecting the C. N. R. model city, Mount Royal, with the city of Montreal, will be rushed ahead with all possible speed.

Mr. George A. Smith, Alberni, B.C., has been awarded a contract by the Canadian Northern Railway for right-of-way surveys for that road from Alberni to Cowichan Lake. The route will be along the Alberni Canal to China Creek, and up that stream to a point near where Cox Lake empties into China Creek. The line then strikes Alberni on a high level, swings across Dry Creek, and across the E. & N. Ry. tracks on a high level bridge. From this point the approach to Alberni will be either along Gertrude street or Elizabeth street, as the grade may call for. As soon as the work on the right of way as far as Alberni is completed, it is understood that the section from that place to Comox Lake will be taken in hand, and that there will be practically no stop in the programme until the entire island line of the Canadian Northern is finished.

An interesting sign of the times is to be found in the opening of a branch office and warehouse in Toronto by the well-known English engineers, Herbert Morris, Limited.

For many years this company has specialized in the manufacture of electric and hand-operated cranes and chain-blocks, and their products are known throughout the world We understand that this important step was taken after the visit to Canada, some months since, of Mr. Arthur Atherton, who is Chief Engineer to the company, and who also has a seat on the Board of Directors. The Canadian affairs of the company will be under the management of Mr. Malcolm R. Meldrum, an engineer of wide experience in the manufacture of lifting machinery and who is already well acquainted with Canadian business men and the conditions of the Canadian trade. The intention of the company is to manufacture in Toronto.

According to Mr. F. H Clergue, promoter of the North Railway Company, which proposes to build a line from Montreal to James Bay, surveys will be sufficiently advanced by the beginning of the year to give out at least a part of the contracts for the construction of the system, which extends from the mouth of the Nottaway, first to the Bell River, on the Transcontinental, 240 miles, and then to Montreal, a distance of 260 miles or 500 miles in all. Construction can also be carried on north and south from the Grand Trunk Pacific, from the proposed terminus at the mouth of the Nottaway, as well as from this end of the line, and rails can be landed at the James Bay port by sea, as well as at Bell River. Three distinct surveying parties are now at work, and it is expected that one for the North Railway Company will complete their work from the mouth of the Nottaway to the crossing at the Bell River by the end of the year. The Quebec Department of Forests have also a party out, while the Department of Public Works, Quebec, have a third party.

It is believed that the new Lake Shore route, which is now in course of construction by the Canadian Pacific Railway, will be the best and quickest of the three railway routes that in a very short time will pierce that portion of Ontario. The new line will give double trackage between Montreal and Toronto and the cost will entail twelve millions of dollars. The company has large gangs of men pushing forward the work from Agincourt to Oshawa and on to Belleville. Work is also being done at other points on the Toronto side of Oshawa, and the orders are to get a passenger train service going before the spring. The road runs through the north end of Whitby and the south end of Oshawa. The new line leaves the present main line of the C. P. R. one and a half miles east of Agincourt, and proceeds through Scarboro for about four miles, when it enters Pickering township. The two roads run alongside one another for about two and a half miles in Pickering Township, when they separate, the C. P. R. crossing the C. N. R. and proceeding to Whitby in a more direct line.

C. P. R. Activity

During 1912, the Canadian Pacific Railway has purchased 185,300 tons of steel rails. This, with the fastenings, amounting to 14,347 tons, and the tie plates, to 6,500 tons, makes a total of 206,147 tons. These new rails are chiefly of Canadian make, being the output of the Soo and the Sydney mills. They are nearly all 85-pound rails, and the average cost is $33 a ton, the whole order aggregating about $7,000,000. When laid, these rails will extend 1,440 miles—practically from Montreal half-way across the continent, or will reach from St. John, N.B., to within a few miles of Port Arthur. To carry them to where they will be needed would require no fewer than 137 trains—averaging fifty cars to the train—and this long line of trains would, if placed one after another, cover a distance of fifty miles. They would loom large on the prairies between Winnipeg and Portage la Prairie, and, saving five miles, would cover the entire distance between those two places. The new rails will be utilized in the various new roads and extensions of existing ones and in replacing old rails where needed, which in turn will be used for sidings or sent to the scrap heap. It was only a few months ago that the Canadian Pacific placed an order for 12,500 freight cars and 300 locomotives at a cost of $19,000,000.

Personal Mention

Mr. Geo. Murray, contractor, and Mr. Thomas Cowan, builder, both of Winnipeg, died recently.

Mr. A. Macdougall, engineer of the Bishop Construction Company, Montreal, is in the hospital suffering from pneumonia.

Mr. Miller, of the firm of Haney & Miller, Toronto, has gone to Victoria, to look into the question of tendering for the Ogden Point breakwater.

Mr. H. J. Gillis, for thirty-five years a building contractor of Salt Lake City, Utah, has gone to Edmonton to engage in contracting on a large scale. He is a native of Nova Scotia.

Sir Percy Girouard and Mr. J. P. Davidson, members of the firm of Sir William Armstrong, Whitworth & Company, have been visiting the Courtenay Bay development works at St. John, N.B.

At the Ottawa convention of the Canadian Manufacturers' Association last week Mr. R. S. Gourlay, of Toronto, was elected president and Mr. C. B. Gordon, of Montreal, vice-president.

Mr. Alfred Still, Assoc. M. Inst. C. E., has been appointed Chief Electrical Engineer of the mining department of the Algoma Steel Corporation, with headquarters at the Magpie Mine, Ont. Mr. Still was formerly Electrical Engineer of the Lake Superior Power Company, Sault Ste. Marie, Ont.

Mr. E. S. Jenison, formerly with the Henion & Hubbell Company, of Chicago, Ill., has been appointed manager of the Pump Department of the Canadian Fairbanks-Morse Company, Limited, now the exclusive sales agents in Canada for the triplex and power pumps as well as the other lines manufactured by the Goulds Manufacturing Company, of Seneca Falls, N. Y.

Mr. Henry Vivian, chairman of the Co-Partnership Tenants, Limited, and ex-Member of Parliament for Birkenhead, Eng., originator of the city beautiful, the garden city and the garden suburbs plans, recently delivered an address upon "Town Planning" at the First Presbyterian Church, Edmonton, when he urged the heads of the municipality to preserve the beauty spots, as well as work toward a definite plan in city building.

Messrs. Overmeyer and Poole, of the Western Steel Trust Company, of Seattle, returned recently to Victoria after a visit to Prince Rupert, where they went to look over the site of the proposed new G. T. P. dry dock. The contractors report that much has been done by the company carrying out the preliminary work. A 300-foot wharf has been built, grades are now being made and everything is being placed in readiness for the starting of the big floating drydock.

The partnership which has existed between Messrs. David and William Carlyle and Edward H. Beck, as general contractors, under the name of Carlyle & Beck, Limited, Toronto, has been dissolved. Mr. Edward H. Beck is now carrying on business under his own name with offices at 18 Toronto Street.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Hamilton, Ont.
Water meters. City may submit by-law in January for large sum for purchase if scheme to sell water by meter is adopted.

Magog, Que.
The town will purchase cement mixer in the spring in connection with roadways and sidewalks.

Peterboro, Ont.
Sewers will be constructed on Edinburgh street from Rubridge to Stewart streets, and one between Manning ave. and Stevenson street. Engineer, T. A. S. Hay. Tenders to be called.

Point Grey, B.C.
Clearing and grading roads to cost $126,000. Work is under direction of Municipal Council. Clerk, B. A. Cunliffe, Kerrisdale. By-law passed.

Waterworks system to cost $200,000. Clerk, B. A. Cunliffe, Kerrisdale. By-law passed.

Regina, Sask.
Sewer and water main (extensions). Clerk, A. W. Pool. Plans in progress.

St. Charles, Man.
Grading and gravelling planned for rural municipality of Assiniboia. Sec.-treas., Frank Ness. Plans, specifications etc., with secretary who will also receive tenders for grading and graveling Woodlands road.

St. John, N.B.
Pipe. Tenders to be called for supplying 2,500 ft. of 15-in. terra cotta pipe and about 80 ft. of connections of various sizes. Engineer, Wm. Murdock. Clerk, H. E. Wardroper. Commissioner of sewerage, R. W. Wigmore.

Sarnia, Ont.
Waterworks and intake to cost $240,000 (Point Edward). Engineer, H. A. McLean. By-law to be voted on.

Vernon, B.C.
Cement sidewalks to cost $11,640. Clerk, D. G. Tate. Tenders to be called.

CONTRACTS AWARDED

Montreal, Que.
Centrifugal pumps, etc. Clerk, L. O. David. Engineer Supt., Major S. Howard J. McDougall, Caledonian Iron Works. Pump A $2,942; Canada Foundry Co., Toronto, Ont., Pump B, $2,605; Pump C, $1,722; Pump D, $7,420.

Sherbrooke, Que.
Sewer pipe mains on Wellington and Meadow streets. Secretary, F. J. Griffith. Engineer, Thos. Tremblay. General contractors, Codere Sons & Company.

St. John, N. B.
Sewer, Church street. Commissioner of Sewage, Rupert W. Wigmore, City Hall. General contractor, M. Tobias, 276 Brussells street. Laying a 45-ft. sewer at $3.75 per lineal ft. for rock and 75c. for earth.

St. Laurent, Que.
Sidewalks, etc., to cost $50,000. Sec.-treas., C. S. Tasse, M.P. General contractors, Harris Construction Co., Ltd., 120 Sanquinet street, Montreal.

Stratford, Ont.
Covering Romeo Creek to cost $29,600. Clerk, Mr. Lang. General contractor, M. Walter Davies. Engineer, Mr. Manson, City Hall. Reinforced concrete and steel construction.

Railroads, Bridges and Wharves

Battleford, Sask.
Railway. Engineer, B. B. Kelliher, Winnipeg. The Board of Railway Commissioners have authorized the G. T. R. Railway to construct a railway between its Battleford and Cutknife branches and to establish terminal at Battleford.

Cobourg, Ont.
Extension to breakwater. Tenders received by Sec. R. C. Desrochers, Ottawa, Dept. Public Works, until Oct. 16th. Plans at office of Dept. J. C. Sing, Confederation Life Bldg., Toronto; J. L. Michaud, district engineer, Merchants Bank Bldg., Montreal; Postmaster, Toronto, and MacLean Daily Reports, Toronto and Montreal. Extension to west breakwater.

Elmira, Ont.
A large petition has been sent to head office of the Grand Trunk Railway to have the Elmira & Galt branch electrified.

Hamilton, Ont.
Wharf or retaining wall 1566 ft. long by 10 ft. wide, for Dominion Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Chairman of Harbor Commissioners, Geo. J. Guy. Tenders called.

Freight yard addition to Elgin street from Barton to Cannon. The Grand Trunk Railway Co., engineer, H. S. Safford, Montreal, will install considerable additional trackage and may erect additional sheds later. Company doing its own work.

Horton Landing, N.S.
Bridge, Kings Co. over Gaspereaux River, for Dominion Atlantic Ry. Res. engr., M. A. Fullington, Kentville, N.S. The Board of Railway Commissioners have authorized the construction.

Lillooet, B.C.
Railroad. Survey is being made for railroad from Lillooet Lake country to Port Haney on the Fraser river; will be used for carrying timber and will possibly be equipped for passenger service. Interested, British Columbia Electric Ry. Co., 16 Hastings E. Sec., J. V. Armstrong.

London, Ont.
Railway extension planned for Grand Trunk Railway. S. Davidson, c/o company, London, has charge of proposition; new line from London to Aylmer.

Milverton, Ont.
Spur will be constructed by Canadian Pacific Railway for Milverton Furniture Co. Engineer, A. L. Hertzberg, Toronto.

North Toronto, Ont.
Subway, Avenue Road, for Canadian Pacific Railway. Tenders received by Engineer Grade Separation, B. Ripley, 260 Avenue Road, until noon Oct. 5, 1912. Plans, specifications, etc., at his office.

Ottawa, Ont.
Concrete bridge, 1st concession Marlborough, for County of Carleton. Engineer, R. W. & S. E. Farley, 164 Sparks street. Plans at office of engineer. Tenders received by Clerk, C. W. McNab, until Oct. 9th. Concrete abutments, concrete floors on steel beams.

Portage La Prairie, Man.
Railway buildings. The Great Northern Railway, engineer, J. H. Jeffrey, will make this point headquarters for Western Canada and will build extensive shops.

Portage Du Fort, Que.
Station planned for C. N. R. Chief engineer, H. K. Wicksteed, Toronto, Ont. The Board of Railway Commissioners have approved of location.

South March, Ont. (March Twp.)
The Board of Railway Commissioners have approved of work.

Station to be erected for C. N. O. R. Chief Engineer, A. F. Stewart, Toronto.

St. Hyacinthe, Que.
Station. The Board of Railway Commissioners have authorized C. P. R. to change location of station at St. Hyacinthe. Divisional Engineer, F. Taylor, Montreal.

Ste. Victoire, Que.
Wharf. (County of Richelieu). Dominion Govt. Dept. Public Works. Sec., R. C. Desrochers, Ottawa. Tenders to be called for construction of a close faced cribwork wharf.

Toronto, Ont.
Siding. The Board of Railway Commissioners have authorized construction of siding 500 ft. long connected with C. P. R. near Bryce avenue. Engineer, A. L. Hertzberg.

Trail, B.C.
Railway. C. P. R., engineer of construction, C. W. P. Ramsey, Montreal, have decided to construct line from

Trail, B.C., to Metaline Falls, Wash., U.S.A. Distance 41 miles.

Twin Butte, Alta.
Station. The Canadian Pacific Railway will build here. Site has been approved by Railway Commissioners. Divisional Engineer, J. G. Sullivan, Winnipeg.

Twp. of Fitzroy, Ont.
Bridge. The Board of Railway Commissioners have authorized C. N. O. R. to construct bridge across Stoney Creek, Twp. Fitzroy, County Carleton, Ont., 344 miles from Ottawa, and to divert Jimmy's Creek.

Twp. Trafalgar, Ont.
Bridge. Engineer, W. R. Chapman, 9 Toronto street, Toronto. The Board of Railway Commissioners have authorized C. N. O. Ry. to construct bridge across Twelve Mile Creek, Trafalgar Twp., Walton Co., 27.64 miles from Toronto. Deck and steel plate girder span bridges on concrete piers and abutments.

Vancouver, B. C.
Railway. The Canadian Northern Ry. Company, secretary, W. H. Moore, Toronto, Ont., have announced that passenger terminals of the road will be in Vancouver. Local freight sheds will be placed in the False Creek bottoms; freight terminals for transcontinental freight will be located at Port Mann.

CONTRACTS AWARDED

Ayton, Ont.
Bridge to cost $14,000 for Twp. of Normandy pr. A. Schenk, Ayton. Engineer, I. Traver, Dundalk. Contractor, J. Palm, Mildmay, Ont., $6,000. Steel work, Hamilton Bridge Co., Hamilton, Ont., $7,000.

Comaplix, B.C.
Wharf to cost $7,990 for Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, Hurbert S. Bcharrell, New Westminster, B.C. Pile bent wharf 372 x 32 x 12.

Edmonton, Alta.
Railway station for Canadian Pacific Ry. General contractor, C. W. Sharp & Sons, Edmonton. Structural engineer, C. A. P. Turner & Co., Canada Bldg., Winnipeg. Mushroom system construction.

Midway, B.C.
Stations, water tanks, section houses for The Kettle Valley Ry., Penticton, B. C. Engineer, A. McCullock, Penticton, B.C. General contractor, Wm. Bouthron, Grand Forks, B.C.

Port Arthur and Fort William, Ont.
Dredging to cost $53,705 required at New Ontario coal dock and at the Ferry dock. Dom. Govt. Dept. of Pub. Wks. Sec., R. C. Desrochers, Ottawa. General contractors, Soo Dredging & Construction Co., Sault Ste. Marie.

St. John, N.B.
Grain elevator to cost $500,000 for Canadian Pacific Ry., head office Montreal. General contractor, Jno. S. Metcalfe Co., 54 St. Francois Xavier street, Montreal. Foundations will consist of 98 concrete piers 9 x 5 and from 8 to 15 ft. deep.

Upper Maugerville, N.B.
Wharf to cost $2,879 for Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, Frank L. Boone, St. Mary's Ferry, N.B.

Vancouver, B.C.
Station for C. P. R. Co. General Superintendent, F. W. Peters. General contractors, Westinghouse, Church, Kerr & Co., East Calgary. Steel work, Jno. Coughlan & Sons, 142 Hastings St. W. 2,500 tons of steel.

Weymouth, N.S.
Dredging to cost $31,525. Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractors, Halifax Dredging Co. Ltd., Halifax.

Business Buildings and Industrial Plants

Calgary, Alta.
Temporary warehouse for Vernon Fruit Co., 9th avenue east. Architect, Chas. Hay, 52 Thomas Block. 1-sty., 91 x 31, frame construction. Plans drawn.

Bank building planned for Royal Bank of Canada. Company have purchased site.

Factory to cost $10,000 for Globe Woollen Mills, 8th avenue E. Brick and concrete construction. Plans in progress.

Stores to cost $6,000, 7th avenue east, for P. O'Sullivan, 1027 10th avenue west. Architect, A. Pirie, Board of Trade Bldg. 1-sty., 20 x 120, cement foundation, tile and brick construction. Plans drawn.

Dauphin, Man.
Bottling factory, 2nd street s.w., for Dauphin Areated & Bottling Co. Architects, Hautfenbak & Steen. One sty., 30 x 40. Foundation in.

Enlarging factory. The Dauphin Mineral Works Company contemplates building an addition to present structure and also anticipate building a brewery next spring.

Edmunston, N.B.
Pulp mill for Donald Fraser & Son, Plaster Rock, N.B. Manager, Archie Fraser, Plaster Rock, N.B. Engineer, Mr. Furlong. Plans in progress.

Fort William, Ont.
Bank and business block to cost $30,000, Victoria, for Merchants Bank. Architect, Carl Wirth. 2-sty., 50 x 75, cement foundation, Bedford stone and pressed brick construction. Tenders called.

Gaspe, Que.
Lumber and pulp mill addition, for Dalhousie Lumber Co., Dalhousie, N.B. Plans in progress.

Hamilton, Ont.
Factory planned for the Buffalo Brake Beam Co., Buffalo, N.Y. Pres., Thos. E. Carliss, c/o Buffalo office. Company expect to purchase new site and erect large plant next year.

Addition to factory planned for Canadian Cottons Ltd., 352 McNab street N. (A. E. Adams). Site adjoins present plant; addition to be built next year. Architect not chosen.

Exchange and office building to cost $120,000 for Bell Telephone Co. of Canada. Local manager, Mr. Thorpe, 54 Hughson street. Architect, W. J Carmicael, Montreal. 4-sty., 80 x 130, brick and stone construction. Foundation in.

Addition to garage (John street) for Thos. Ramsay, 15 Market Square. Tenders close with Architect, E. B. Paterson, 167½ King street E., Oct. 5th. 2-sty. addition, 155 x 50, brick and steel construction.

Factory. Canadian Roll & Machine Co., Ltd., incorporated with capital of $500,000, plan to erect a plant here. Interested, Jno. L. Counsell, Alex. McFarlane and others.

Vinegar factory, Gibson and Cannon streets, for A. E. Bell, 931 King street. 3-sty., cement block construction. Architect not decided on yet, but plans will be prepared shortly.

Humberstone, Ont.
Addition to plant. The Deere Machine Co., Moline, Ill., have taken over plant of the Dain Co. and are having plans prepared for an additional building.

Kamloops, B.C.
Candy factory for F. Rochen, 2nd ave. and Fifth street west. Calgary, Alt.. Plans in progress.

London, Ont.
Alterations to offices for The London Advertiser. Manager, R. D. Millar. Additional equipment will be installed. Plans to be prepared.

Factory to be erected for the Ideal Concrete Co., 211 King street. Manager, J. Pulfer. Site to be selected and plans prepared shortly.

Lower Woodstock, N.B.
Sawmill to cost $6,000 for James Scott. Architect, Harry Dunbar, Woodstock, N.B. Concrete foundation, wood construction. Steam power plant required. Plans being prepared.

Macleod, Alta.
Bank building to cost $30,000 for Bank of British North America. Local manager, F. McRae. Plans being prepared.

Medicine Hat, Alta.
Addition to factory for the Alberta Linseed Oil Mills Ltd. Pres. and managing-director, J. McNeely. It was decided at the annual meeting to enlarge plant by one-fourth.

New Westminster, B.C.
Factory for East Westminster Woodworking Co., Ltd. Manager, W. Ramey. Site purchased. Plans will be prepared.

Warehouse will be built on new wharf for the B. C. Transport Co. Architect, E. J. Boughten. 1-sty., 40 x 200. Plans prepared.

Niagara Falls, Ont.
Warehouse planned for Dunkirk & Lake Shore Seed Co., Dunkirk, N.Y Mayor, C. C. Cole. Clerk, W. J. Seymour. Negotiating for site and concessions.

Ottawa, Ont.
Factory to cost $5,200, Laurier W., for Geo. McGillvray, 414 Laurier avenue W 33 x 62, brick foundation. Plans in progress.

Prince Albert, Sask.
Plans for The Great Western Iron Wood & Chemical Co., head office, Dorchester, N.Y. Architect, Creighton & Crowter. Directors of company, D. H. Hanna, 30 Castle Frank road, Toronto, Ont.; F. H. Phippen, Can. Northern Bldg., Toronto; Hector McInnes and

Felix Frank, of Halifax, N.S. Capital of company, $500,000. Plans in progress.

Point Edward, Ont.

Refrigerating plant, warehouse, laundry, etc, for Northern Navigation Co. Manager, Mr. Gildersleeve, Sarnia. Architect, R. W. Fawcett, 152 Essex St., Sarnia, will call for tenders shortly. Refrigerator 48 x 32; ice house 200,000 tons capacity. Plans in progress.

Redcliffe, Alta.

Plate glass factory for H. Munderloh, 51 Mansfield street, Montreal, Que., and Mr. G. Lyciatte, Lisgar street, Wallaceburg, Ont. Plans in progress.

Regina, Sask.

Warehouse to be erected for Peart Bros., hardware dealers. Plans in preparation.

Warehouse to cost $50,000, Broad St. and 6th avenue, for H. G. Smith & Co., wholesale grocers. Architects, Storey & Van Egmond, Credit Foncier Bldg., are preparing plans.

Stouffville, Ont.

Furniture factory, cost $75,000, under consideration. Interested, F. R. Fisher, Newmarket. Steel and concrete construction, 200 x 50. Will manufacture office furniture, fixtures, etc.

St. John, N.B.

Laundry building, Waterloo street, for Ungars Laundry Ltd. Manager, A. K. Mundee, 28 Waterloo street. Architect, F. Neil Brodie, 42 Princess street. Company have bought property adjoining their plant on Waterloo street. Will demolish old building and rebuild 2-sty. and basement, 100 x 100.

Toronto, Ont.

Addition to store, cost $14,000, for A. E. Humphrey, 364 Queen St. West. Architects, Mallory & Thatcher, 31 Queen W. Three storeys, brick and concrete construction. Plans drawn.

Warehouse to cost $6,500, Yonge St. N., for Toronto Pottery Co., 95 Cottingham street. Architect, J. W. Siddall, Janes Bldg. 2-sty., frame and galvanized iron. Plans drawn.

Factory to cost $10,000, Dupont street, for Thompson Monument Co. Ltd., c/o Jas. Hawkens, sec.-treas., 1192-4 Yonge street. Architect, W. O. Fraser, 34 Victoria street. 1-sty., cement foundation, frame and steel construction. Plans drawn.

Addition to laundry to cost $3,500, Seaton street, for Haven & Prison Gate Mission, 320 Seaton street. Architects, Harkness & Oxley, 704 Confederation Life Bldg. 2-sty., brick construction and foundation concrete. Tenders called.

Stores and residences to cost $4,000, Gerrard E., for Miller & Snook, 932 Queen E. Stone foundation, brick and cut stone construction. Plans drawn.

Garage for Central Garage & Supply Co., c/o R. B. Hayley & Co., Temple Bldg. Tenders received by architect, H. Bryan Gilbert, 47 Wellington E. 5-storey, 64 x 100.

Addition to Queens Hotel. Prop., Messrs. McGaw & Winnett, Front St. W. 4-sty., 60 x 200, brick construction. Plans in progress.

Vancouver, B.C.

Addition to factory for The Morrison Steel & Wire Co., 831 Powell street. Plans being prepared.

Stores and apartments, cost $20,000, 1115 Pender street, for Jarvis Bros. Architects, Doctor, Stewart & Davie, Arts & Crafts Bldg. Tenders received by architects. Two buildings, each three storeys and basement, 33 x 85, mill construction.

Victoria, B.C.

Office building, 8 storeys, Fort and Government streets, for Canadian Northern Ry. Co., head office, Toronto, Ont. Company's architect, Toronto, is preparing plans and site has been secured.

West Toronto, Ont.

Fertilizer building for Wm. Davies Co., Front street east, c/o E. J. Menzies, 269 Jarvis street. One storey, brick, frame and galvanized iron construction. Plans drawn.

CONTRACTS AWARDED

Brome, Que.

Creamery for Dominion Government, Dept. of Agriculture, Ottawa. General contractors, D. Green & B. McClay, Brome.

Calgary, Alta.

Alteration to hotel to cost $4,000, Victoria Hotel, for L. Charlebois, Victoria Hotel. Builder, C. H. Wells, 1811, 18th street W.

Stores to cost $4,000 for Black & Shaw, 9th avenue E. Builder and general contractor, Collins Bros., 1235 12th avenue W. 1-sty., 32 x 50, cement foundation, brick construction.

Stores and rooms to cost $4,000, Edmonton Trail. Builder and general contractor, H. Rankin, 317, 6th avenue N.E. Cement foundation, frame construction. Excavation started.

Garage to cost $10,000, 17th avenue W., for J. K. Kerr, 628 12th avenue W. Builder and general contractor, J. F. Black, 337 19th avenue W. 1-sty., 50 x 150, cement foundation, tile construction.

Addition to office building to cost $25,000, for C. P. R. Dept. of Natural Resources. Architects, Hodgson, Bates & Butler, Grain Exchange Bldg. Builders, G. H. Archibald & Co., box 1739. 1-sty., 70 x 130.

Stable and store room to cost $25,000 for Carlyle Dairy Co., 5th avenue west. General contractors, Groff & Hook, 1330 15th avenue west. 3-sty., 32 x 112, brick and structural steel construction.

Warehouse to cost $10,000, 10th Ave. W. Owner and general contractor, A. B. Cushing Co., 403 8th ovenue west. Architect, Laing & Smythe, Beveradge Blk. 2-sty., 25 x 115.

Coquitlam, B.C.

Factory to cost $20,000 for The Call Switch Co., 770 Granville street, Vancouver. General contractor, Coquitlam Construction Co. Lumber, Brunette Sawmill Co. Corrugated iron, McClary Mfg. Co. Sash and doors, Cedar Cove Sash & Door Co. 200 x 100, corrugated iron construction. Other buildings will be built later. $250,000 will be expended altogether.

Ft. William, Ont.

Business block to cost $20,000, May street, for I. I. Flannigan. Architect and general contractor, C. Ward. 2-sty., 50 x 70, brick construction.

Bank building to cost $30,000, Victoria avenue, for Union Bank. Architect, Carl Wirth. General contractors, Seaman & Penman. 3-sty., 25 x 90, solid brick construction.

Packing house to cost $40,000, Simpson street, for Matthews Laing Co., foot Bathurst street, Toronto. Architect, E. J. Greenstreet, 32 Adelaide street E., Toronto. General contractor, M. H. Braden, Ft. William. 2½-sty., 40 x 86, and 50 x 95, cement foundation, reinforced concrete and mill construction.

Stores to cost $4,000, Simpson. Builder and architect, Jno. King. 1-st., 50 x 75, cement foundation, frame construction. Work done by day labor. Excavation started.

Gananoque, Ont.

Alterations to machine shop for Spring Axle Co., King and Pine streets. General contractors, Byers & Anglin, 65 Victoria street, Montreal. Roofing, Henry Bedard, Brockville, Ont. Machinery required for manufacture of automobile springs.

Extension rolling mill plant for D. F. Jones Mfg. Co. General contractors, Byers & Anglin, 65 Victoria street, Montreal.

Lower Southampton, N.B.

Shingle mill to cost $14,000, for Bert. Dunham. General contractors, Dunbar Engine & Foundry Co., Woodstock, N. B. (Harry Dunbar) will install electric plant for 50 lights or more.

Montreal, Que.

Office building to cost $1,000,000, St. John and Hospital streets, for W. F. Lewis Estate, 30 Hospital street. Architect, K. G. Rea, 54a Beaver Hall Hill. General contractor, E. G. Caps, Beardmore Bldg., 59 Peter street. 10-sty., 120 x 100, fireproof construction, Ohio Sandstone faced. Old building being wrecked.

Store (addition) to cost $6,000, St. Catherine E. Owner and builder, N. G. Valiquette Co., Ltd., 477 St. Catherine E. 1-sty., 96 x 63, cement foundation, brick construction.

Ottawa, Ont.

Stores and dwellings to cost $4,500, Murray. Architect and builder, Alph. Julien, 265 Dalhousie street. 3-sty., 30 x 60, brick veneer.

Stores and apartments to cost $30,000 for S. Millar, Bank street. Architect, W. H. George, Castle Bldg. General contractor, Alex. Christie, Kenniston Apartments. 4-sty., brick construction, stone foundation.

Quebec, Que.

Stores and residence for Eug. Paquet, 386 St. Joseph street. General contractor, Arthur Mercier. Roofing, L. Lachance. 3-sty., 30 x 45, stone foundation, red brick construction.

Store and residence. Owner and general contractor, Eug. Paquet, St. Ambroise and Derilliers. Mason, E. Cote. Roofing, N. Barbeau, 36 Bridge street. Ptg., Marier & Tremblay. 3-sty., 40 x 30, stone foundation, red brick construction.

Store and residence to cost $4,000. Owner and general contractor, F. Clement, Durocher and Bagot street. Builder, D. Maranda & Frere, c/o owner. Rfg., plmbg. and electric work, P. P. Giguere & Co. 3-sty., 30 x 30, reinforced concrete and brick construction.

Store and residence, Maisonneuve. Owner and builder, Mendoza East, Maisonneuve street. 1-sty., 33 x 30, stone foundation, frame and brick construction.

Rock Bay, B.C.
Planing mill, etc., planned for The Canadian Puget Sound Lumber Co. Gen. contractor, Parfitt Bros., Vancouver, B. C. Rebuilding factory destroyed by fire.

Sherbrooke, Que.
Foundry, boiler and machine shop. Owner and general contractors, Sherbrooke Iron Works. Manager, A. G. Campbell. Architect, H. G. James. 1-sty. foundry, 120 x 96 x 40, boiler shop 60 x 40 x 30, machine shop 120 x 96 x 40, steel frame.

Machine shop for Canadian Ingersoll Rand Co. Iron work, McKinnon Holmes & Co. 1-sty., 125 x 125, brick wall, steel frame. Foundation in.

Warehouse to cost $5,000 for Sherbrooke Iron, Metal & Hide Co. Architect, C. E. White. General contractors, J. V. Laplante Co. 2-sty., 50 x 50.

Stratford, Ont.
Addition to hotel, Albert street, for T. I. Gillespie. Windsor Hotel. Architect, J. R. Russell, 21 Downie street. General contractors, Pounder Bros. Ptg., J. L. Money. Electric work, F. C. Whatmough.

Toronto, Ont.
Store and residences to cost $5,000. Grace and Harbord. Owner and builder, C. Coulter, 365 Palmerston avenue. Architect, P. H. Finney, 79 Adelaide E. Stone foundation, brick construction.

Vancouver, B.C.
Store and apartments to cost $30,000, 612-14 Powell street, for Kwong Wo Yuen. Architect, A. E. Cline, 214 16th avenue E. General contractors, J. J. Fronz Construction Co. 4-sty., brick and concrete construction.

Wilkie, Sask.
Machine shop for C. P. R. Engineer of construction, W. A. James, Winnipeg, Man. Builder and architect is owner. Work to start immediately.

Store to cost $12,000, Austin street, for E. M. Barber, c/o general contractor, John Farquhar, 269 Balmoral street. 2-sty., 22 x 100, stone foundation, brick construction. Excavating started.

Alterations to Wolseley Hotel to cost $12,000, Higgins avenue. Architect and general contractor, B. G. Fonesca, 344 River avenue.

Winnipeg, Man.
Office building to cost $600,000, for Winnipeg Electric Street Railway. Architects, Pratt & Ross, Union Depot. Con. arch., Chas. S. Frost, 105 South La Salle street, Chicago, Ill. Mechanical engineers, Pierce Richardson & Neiler, 431 South Deborne street, Chicago, Ill. Structural engineers, E. C. & R. M. Shankland, 209 South LaSalle street, Chicago, Ill. General contractors, Carter-Halls-Aldinger & Co., 1010 Union Bank Bldg.

Public Buildings, Churches, Schools, etc.

Brandon, Man.
School. The School Board will shortly call for plans and estimates on 12-room reinforced concrete building

Calgary, Alta.
School, Bronx District. Architect, H. McLelland, City Hall. Site has been purchased and plans will be prepared.

Church to cost $40,000, Elbow Park, for Anglican Synod, 7th avenue E. Site donated by F. C. Lowes. Plans to be prepared.

Comox, B.C.
Post office to cost $5,000 for Dominion Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Plans in progress.

Elmira, Ont.
Library to cost $7,000. Secretary Library Board, I. Hammond. Full particulars from secretary or clerk, J. H. Ruppel. Plans prepared.

Hamilton, Ont.
Jail, farm buildings, etc., contemplated by Board of Control. Mayor, Geo. H. Lees. Engineer, A. F. McCallum. Council may submit by-law in January for jail farm on Stewart Park property. New buildings, grading and machinery required.

Kentville, N.S.
Church to cost $9,000, for Presbyterian Congregation. Chairman of Building Committee, Geo. E. Calkin. Frame construction. Plans in progress.

Kingston Station, N.B.
Baptist church to cost $7,000, frame construction. Chairman Building Committee, Gifford Oakes. Plans to be prepared.

London, Ont.
City Hall to cost $250,000, Queens avenue and Wellington street. Council will prepare plans at once.

Skating rink to cost $35,000 for L. A. Berlin of Winnipeg, c/o architect, H. C. McBride, 501 Colborne street. 1-sty., 75 x 150. Plans in progress.

Alterations to Club House and Curling Rink for The Thistle Club. Plans to be prepared.

Montreal, Que.
Church for Parish of St. Jean Baptiste. Plans, specifications, etc., with architect, C. St. Jean, 244 St. Catherine E. Tenders received by church warden until Oct. 5th.

Moose Jaw, Sask.
Y. M. C. A. to cost $250,000. Site to be purchased at once and plans will be prepared.

Niagara Falls, Ont.
Hockey rink to cost $10,000, Queen street. Owner, Niagara Falls Hockey and Athletic Club. Sec., R. C. McFarlane. Architect, C. M. Borter, Niagara Falls S. General contractor, Geo. Mason, Ingersoll. 1-sty., 145 x 125, concrete foundation, frame construction, patent roofing, electric lighting.

Ottawa, Ont.
Market building. Clerk, J. Henderson. Architect, F. C. Sullivan, Castle Bldg., has prepared plans for modern covered market at Plouffe Park, corner Somerset & Preston streets. Market commission considering plans.

Picton, Ont.
Drill hall for Dom. Govt. Dept. of Militia & Defence. Sec., F. F. Jarvis, Ottawa. Plans to be prepared.

Point Grey, B.C.
School building to cost $155,000 to be erected. By-law carried. Clerk, B. A. Cunliffe, Kerrisdale.

Portage la Prairie, Man.
Industrial school, cost $10,000, planned. Two storeys and basement, brick and concrete construction, school room and gymnasium equipment required.

St. Boniface, Man.
Park buildings. The City Council contemplate erection and by-law will be submitted this fall. Clerk, J. B. Cote.

Drill hall planned for Dominion Govt., Ottawa. Dept. of Militia & Defence. Sec., E. F. Jarvis. Interested, Major Fortunate Lachince, 3 Langevin street, of the 13th Field Battery. Government will build when city grants site.

Toronto, Ont.
School, Williamson road. Secretary-treasures, W. C. Wilkinson. School architect, F. G. Belfry. Tenders called soon for both a 9-room and 29-room building. 1 or 3 storeys, brick foundation and construction

Addition to theatre for J. Levine, 1228 Queen west. Architect, Len Foulds, cor. King street and Leader Lane. Brick foundation, brick construction. Plans drawn.

Post office for Dom. Govt., Ottawa, Post Office Dept. Postmaster-General, Hon. L. P. Pelletier. Sec., Wm. Smith. Plans to be prepared at once.

Weather strip, City Hall. Specifications, etc., at office of the Property Department, City Hall. Tenders received by Chairman Board of Control, G. R. Geary, until noon, Oct. 8, 1912.

Shelter, Ketchum Park. Mayor, G. R. Geary. Tenders will be received by Bd. of Control until Oct. 8th for mason work etc., carpenter work, galv. iron., plumbing, heating, electric wiring, fixtures, plastering, ptg. and glazing. Plans and specifications at office of City Architect, City Hall, Toronto.

Transcona, Man.
By-law passed authorizing following local improvements. Municipal buildings, $18,000; waterworks site, $7,400; sidewalks, $16,000; pound, $9,000. Sec.-treas., Mr. Campbell.

Winnipeg, Man.
City Hall to cost $3,000,000. The Board of Control, secretary, M. Petersonn, has extended time for receiving preliminary designs for proposed city hall from Nov. 11th to February 15th, 1913.

Parliament Buildings to cost $2,000,000. Minister, Colin H. Campbell. Department of Public Works have chosen plans of Frank W. Simon, 51 North John street, Liverpool, Eng.

School is planned for Presbyterian Church. Interested, Rev. A. G. Sinclair, 129 Elgin avenue. Site not yet chosen.

CONTRACTS AWARDED

Gananoque, Ont.
Post office to cost $29,973. Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, F. A. Blakely, Gananoque. Foundation in.

Montreal, Que.
Lavatory to cost $20,000 for R. C. School Commissioners, Plateau avenue. Architect, Asselin & Brosseau, 17 Place d'Armes. General contractor, J. Denis.

(Continued on page 83)

Tenders and For Sale Department

Bridge Tenders

Sealed tenders endorsed "Tenders for Bridge," will be received up to Wednesday, the 9th day of October, 1912, for the construction of a bridge on the town line between the counties of Lanark and Carleton, opposite lot 30 in the 1st concession of Marlboro. Bids are aksed for a bridge having concrete abutments and concrete floor upon steel beams; likewise upon alternate plans for a wooden bridge. Clear span 25 feet.

Plans and specifications may be seen and forms of tender obtained at the office of the R. W. & S. E. Farley, 164 Sparks street, Ottawa.

CHAS. MACNAB,
County Clerk.
39-40-33

Tenders for
Electrical Plant

Sealed tenders addressed to T. F. Acheson, Secretary-treasurer, and marked "Tenders for Electrical Plant," will be received until 12 noon, **October 31st, 1912**, for the following:—

One 500 B.H. Diesel Engine direct coupled to alternator and exciter.

One switchboard with auxiliary panel and series tungsten street lighting apparatus.

Specifications to be obtained on application to the office of the Town Electrical Engineer.

A certified cheque for five per cent. of the amount of the tender must accompany each tender.

The lowest tender will not necessarily be accepted and the right is reserved to reject any or all tenders.

M. M. INGLIS, Electrical Engineer,
Yorkton, Sask.
39-40-28.

TOWN OF NORTH BAY
Water Works Extension

Tenders endorsed "Tender A" and "Tender B" will be received by the undersigned up to 12 o'clock noon, Saturday, October 5th.

"Tender A"

For supplying approximately—
750 ft. of 16-in. Steel Intake Pipe.
Three flexible joints for 16-in. pipe.
2,300 ft. of 12-in. cast iron pipe.
One cast iron increaser, 12 in. to 14 in.
Two 12-in. elbows.
One 12-in. gate valve.
Sixty feet of 10-in. cast iron pipe.
Two 10-in. tees.
One 10-in. gate valve.

To be delivered f.o.b. cars North Bay. Tenderers to state what date the material can be supplied.

"Tender B"

For laying approximately—
750 ft. of 16-in. steel intake pipe in Trout Lake.

The construction of a concrete well on the Lake Shore.

Laying approximately 2,300 ft. of 12-in. cast iron pipe from the pump house to the reservoir, and making the necessary connections to connect two pumps to two delivery lines, and two intake branches to the well, a distance of about 25 feet.

Material to be supplied by the Corporation on board cars at North Bay.

Plans and specifications may be seen at the office of the Commissioner of Works.

The lowest or any tender not necessarily accepted.

T. N. COLGAN,
Commissioner of Works.
North Bay, Sept. 16, 1912. 39-40-34

Tenders for Dredge

Sealed tenders will be received by A. O. Powell, Harbor Engineer for the City of New Westminster, B.C., at his office in Room 22, 26 Lorne street, until twelve o'clock noon, of **Tuesday, October 8th, 1912**, for a ladder dredge having a capacity of 250 cubic yards per hour and excavating to a depth of 25 feet. Further particulars upon application. 38-40-29.

Outfall Sewer Tender

Tenders are required for Outfall Sewer by Town of St. Lambert. Plans and specifications can be seen at Town Hall from **October 3rd to 8 p.m. October 14th, 1912**, when tenders will be recceived and opened.

The Town will require an accepted cheque covering ten per cent. of cost on awarding contract.

J. G. BEATTY,
Secretary-Treasurer,
St. Lambert, Que.
40-41

To Contractors

Tenders will be received by the undersigned till **October 24th**, for the erection of a Departmental Store at Vancouver, B.C., for the Hudson's Bay Company.

Tenders (in lump preferred) are required for all trades except Plumbing, Heating, Wiring, and the General Mechanical Equipment.

Drawings, etc., may be seen at our offices on and after September 28th, and at the offices of the Hudson's Bay Company as follows:—
Winnipeg, on and after October 1st.
Vancouver, on and after October 5th.
also at the office of the Clerk of Works at the new building of the Hudson's Bay Company now being erected at Calgary.

A deposit of $15 will be required from each contractor who desires a loan of the drawings and specifications, which deposit will be refunded upon the return of the drawings, etc., in good order, less expense (if any incurred), for carriage.

The lowest or any tender will not necessarily be accepted.

BURKE, HORWOOD & WHITE,
Architects,
28 Toronto Street, Toronto, Ont.
40-38

Tender for Weather Strip

Tenders addressed to the undersigned will be received by registered post only up to 12 o'clock noon on **Tuesday, October 8th, 1912**, for the equipment of windows, fanlights, etc., in the City Hall with metal waetherstrip.

Copy of specifications may be seen and tender form obtained, together with all information relative thereto, at the offices of the Property Department, City Hall, Toronto.

The usual conditions pertaining to tendering, as prescribed by city by-law, must be complied with, and envelope containing tenders must be plainly marked on outside as to contents.

A bond from a guarantee company, satisfactory to the Corporation, will be accepted in lieu of the personal sureties provided for in the tender form.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman Board of Control.
City Hall, Toronto, Sept. 17th, 1911.
39-40-37

Debenture Sale

The County of Lambton offers for sale its debentures, amounting to sixteen thousand dollars, bearing interest at four and one-half per cent., and payable in ten equal instalments of principal and interest, amounting to $2,022.06 each year, first debenture falling due on the fifteenth day of December next, and invite tenders therefor. Copies of by-law will be furnished to intending purchasers on application to the undersigned, to whom tenders may be sent.

JOHN DALZIEL,
County Clerk, Sarnia, Ont.
40-42

For Sale

Electric Lighting Oufit for Country Estate; capacity about 400 16 c.p. lamps. Also separate switchboard and connections if outfit should be used in connection with storage batteries.

Direct connected D.C. Unit.

25 K.W. Canadian General Electric, 125 volt, 200 ampere, 305 r.p.m., 6 pole generator directed to 9 x 10 Goldie & McCulloch "Ideal" center crank horizontal engine, complete with fully equipped marble switchboard.

Also two small Northey duplex steam pumps of 30 and 100 gallons per minute capacity.

Make offer F.O.B. Toronto, Ontario.

Apply Box 604, Contract Record, 220 King Street West, Toronto, Ontario. 40-40

Board of Education

Sealed tenders, whole or separate, addressed to the Secretary-Treasurer of the Board, will be received until

Friday Noon, October 11th, 1912

for the several trades required in the erection of

New Twenty Nine Room School Building on Williamson Road, Kew Beach

Tenders to be submitted as follows:

For Three Storey Building Complete.
For Three Storey Building, One Floor Complete.
For One Storey Building Complete.

Enlargement of Malvern Avenue High School, East Toronto, to the extent of Six Rooms, and for

Plumbing, Heating and Wiring,
Western Avenue School

Specifications may be seen, and all information obtained at the office of the Superintendent of Buildings, City Hall.

Each tender must be accompanied with an accepted bank cheque for five per cent. of the amount of tender or its equivalent in cash.

Tenders must be in the hands of the Secretary-Treasurer, at his office in the City Hall not later than 12 o'clock noon on the day named, after which no tender will be received.

The lowest or any tender will not necessarily be accepted.

W. W. HODGSON,
Chairman of Committee.
W. C. WILKINSON,
Secretary-Treasurer
40-43

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. 11-t.f.

Public Building, Churches, Schools, etc.

(Continued from page 81)

107 Belgrove. 2-sty., 25 x 100, stone construction.

Ottawa, Ont.

School to cost $18,000, Melrose ave. Sacred Heart School, for Separate School Board. Sec.-treas., J. E. Doyle. Architect, F. S. Sullivan, Castle Bldg. General contractors, Robert & White, Cummings Bridge, Ottawa. 77 x 45, stone foundation, brick construction.

Fire hall to cost $27,000. Architect, F. C. Sullivan, Castle Bldg. General contractors, Murphy Bros. Equipment required; full information from Chief Graham.

Laboratory building to cost $12,860, Experimental Farm. Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractors, Taylor & Lackey, 23 1st avenue.

Hospital to cost $100,000, Elgin street, for Trustees of St. Lukes. Architects, Horwood, Taylor & Horwood, 130 Sparks street. General contractors, H. C. Hitch & Co., 193 Sparks street. Sec., Dr. R. W. Powell. Modern equipment required.

Church to cost $90,000, Lyon street, for Bank St. Presbyterian Church. Chairman, R. McKiffan, Sparks street. Architects, Hutchison, Wood & Miller, 50 Royal Exchange Bldg., Montreal. Ptg., Ritchie & Munn, 54 Lorne avenue. Plastering, Murphy & Morrow, 272 Bronson. Iron work, MacFarlane & Douglas, 250 Slater street. Plumbing and heating, Holloway & Douglas, 250 Slater street. Carpenter, McDermid & Tyndall.

Pembroke, Ont.

Public building (alterations) for Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, W. H. Beatty, Pembroke.

Toronto, Ont.

Addition to Strathcona School. Sec.-treas., W. C. Wilkinson, City Hall. Plastering, W. J. Haddock & Son, 792 Crawford street. Mason, J. W. Hill, 61 Roncesvalles avenue. Carpenter, F. Armstrong, 89 Oak street. Iron and steel, Can. Ornamental Iron Co., 88 River St. Roofing, G. M. Bryan, 524 Yonge street. Ptg., F. Palmer & Co., 1472 Queen St. W. Heating and plumbing, F. Armstrong, 277 Queen W. Electric work, Keiths Ltd., 111 King W. Terra cotta, P. Bennett, Kingston road.

Vancouver, B.C.

Convent, 24th avenue and Alexandra street, for Sisters of St. Anne. Architect, J. J Donnellan, Riggs-Selman Bldg General contractor, C. F. Perry, 643 Howe street, is taking tenders for clearing site for convent.

Victoria, B. C.

School to cost $43,645, Oakland. Architect, C. Elwood Watkins, c/o Board. General contractor, Parfitt Bros., 1303 Gladstone.

School to cost $43,975, Burnside. Architect, C. Elwood Watkins, c/o Board. General contractors, Luney Bros., 508 Sayward Bldg.

Residences

Calgary, Alta.

Apartments to cost $12,000, 17th ave. W., for T. W. Bryant, 328 12th avenue E. Architect, J. A. Berrell, 226 David Block. 2-sty., 50 x 66, brick, cement foundation. Plans drawn.

Montreal, Que.

3 residences to cost $10,800, LeCaron and Angers, for A. Dore, Laprairie, Que. 3-sty., 70 x 48, cement foundation, brick veneer construction. Plans in progress.

Residence, St. Andre, for E. Tessier, 2810 St. Hubert. 2-sty., 30 x 25, cement foundation, brick construction. Plans in progress.

Flats, cost $24,000, Sherbrooke street. Owner and general contractor, H. L. Desaulviers, 1476 Papineau. Architect, Art St. Louis, 80 St. Gabriel. Cement foundation, brick veneer construction. Tenders received by owner.

Ottawa, Ont.

Dwelling, Main, for Robt. A. Sibet, 108 Bank street. 2½-sty., 30 x 32, brick veneer, stone foundation. Plans to be prepared.

Point Grey, B.C.

Residence and garage to cost $10,000, for W. G. Moore, 312 Carter Cotten Bldg., Vancouver. Architects, J. P. Mathieson & Son, 532 Granville St., Van. 2½-sty., concrete foundation, frame construction. Plans ready.

St. John, N.B.

Apartment house for Jas. E. Adamson, 127 Stanley street, Montreal, representing company. 4-sty. and basement, 110 x 90, brick construction, buff stone trimmings, concrete foundation, 40 apartments. Plans in progress.

Apartment house, Lancaster, for Harry E. Beyea, c/o W. Daniel & Co., Ltd., Charlotte street, St. John. Site purchased, 100 x 100 and plans will be prepared.

Toronto, Ont.

Two residences, cost $5,000, Oakmount road, for A. A. Lynd, 52 Bousted ave. Brick foundation and construction Plans drawn.

2 residences to cost $4,000, Beresford avenue, for H. Lavine, 271 Marie street 2-sty., brick construction and foundation. Plans drawn.

Residences to cost $8,000, 11 Edgar avenue, for R. Mowbray, 4 Howard St. Architect, J. H Stanford, Bloor and Ossington avenue 2½-sty, 36 x 31 Plans drawn.

Victoria, B.C.

Residence to cost $12,000, 12 rooms, Moss street, for James & James. Plans prepared. Tenders will be called.

Vancouver, B.C.

Residence, Kitsilano, for J Oliver Architect, W. D. Goodfellow, 303 Hastings W. 2-sty. and basement, frame construction. Plans in progress.

CONTRACTS AWARDED

Calgary, Alta.

Apartments to cost $15,000, 15th ave. west, for W. J. Brigden, 1417 11th street. Builder, S. G. Tetley, 720 2nd avenue. 2-sty., 50 x 66, brick construction, cement foundation.

Residence to cost $4,000, Rosedale, for Dr. Heacock. Architect and builder, Archer Bros. & Sigley, 640 18th Ave. N. W. 2-sty., 28 x 32, cement foundation, frame construction.

2 residences to cost $6,000, Sunalta. Architect and builder, W. S. McDonald, Box 1157. 2-sty., 18 x 36, cement foundation. Excavation started.

Residence to cost $6,000, Glencoe, for J. Howard, 1124 17th avenue west, architect and builder. 2-sty., 44 x 28, stone foundation and construction. Excavation started.

Residence to cost $5,000, Sunalta, for Jas. Henning, 1237 13th avenue. Builder and general contractor, J. R. Stubbs, 1324 12th avenue. 2-sty., 30 x 34, cement foundation, brick construction.

Residence to cost $8,000, Altadone, for J. A. Robertson, Dom. Bank Bldg. Builder and general contractor, W. L. McLam, 1727 33rd avenue west. 2-sty., 20 x 32, cement foundation, frame construction.

Residences to cost $5,000, Glencoe. Builder and architect, J. C. Leslie, 223 25th avenue west. 2-sty., 26 x 30, cement foundation, frame construction.

Residences to cost $4,000, Bridgeland. Builder and general contractor, F. X. Stable, 614 13th avenue east. 2-sty., 18 x 36, cement foundation, frame construction.

Residence to cost $4,000, Elboya. Owner and general contractor, John Christie, 530 15th avenue west. 2-sty., 30 x 34, brick, stone foundation.

2 residences to cost $8,000, Elbow Park. Owner and general contractor, Kennedy & Payne, 7 Belmont Apartments. 2-sty., 24 x 34, frame, cement foundation.

Residence to cost $4,000, Elbow Park Architect and builder, G. R. Kellough, 3223 Elgin avenue. 2-sty., 30 x 30, cement foundation, frame construction Excavation started.

Hamilton, Ont.

3 residences to cost $9,000, for W. Wheatley, Myrtle avenue. Architects, Watt & Blackwell, 125 Lester Chambers Mason, E. C. Mitchell, 89 Sherman ave Carpenter, R W. Miller, Rebecca street. 2½-sty., 32 x 23, stone foundation, brick construction

Apartments to cost $15,000, Bold St., for J. C. Sealey, 187 Bold street Architects, Watt & Blackwell, Lister Bldg R. Tope received contract to the amount of $10,000 2-sty. and basement, brick, cut stone and concrete construction.

Residence to cost $5,000, Cheoke Ave., for H A. Perkins. Architect., Stewart & Witton, 2 Hughson street S General contractor, H C Gummo, 15 Tuckett street Brick construction.

Montreal, Que.

Flats, cost $21,000, Esplanade Owner and builder, J W Charette & Sim ard. 257 St Joseph Blvd. Three stys., 125 x 40, cement foundation, stone construction.

Residence, cost $9,600, Masson street. Owner and builder, Eugene Millette, 454 Lasalle. Three storeys, 45 x 50, brick construction, cement foundation.

Residence, cost $7,200, Gilford. Owner and builder, Louis Beauregard, 1279 Simard. Three storeys, 27 x 50, brick construction, cement foundation.

Residence, cost $20,000, 6th avenue, for R. C. School Commissioners, La cote Visitation. Architect, Dalbe Viau, 76 St. Gabriel street. General contractor, Ulric Boileou, 474 Gilford. Three storeys, 65 x 35, brick, cement foundation.

Residence. Owner and builder, Dominique Londic, Orchard street. 2-sty., 25 x 35, brick veneer construction.

Residence, Drolet. Owner and builder, Ernest Jodoin, 78 Butler avenue. 3-sty., 25 x 52, brick veneer, stone foundation.

2 residences to cost $7,200. Hutchison street. Owner and builder, Joseph Maisonneuve, 2428 Waverly. 3-sty., 25 x 42, brick veneer, stone foundation.

Residence to cost $6,000, Decarie Blvd., for Sisters of Providence, Boulevard Decarie. Builder, H. Tessier, 642 Parc Lafontaine. 2-sty., 30 x 40, stone construction and foundation.

Residence. Owner and builder, H. Trottier, 1853 De la Roche. 2-sty., 25 x 40, cement foundation, pressed brick construction.

Residence. Owner and builder, Theophile Roy, 2275 Desjardins. 2-sty., 25 x 36, brick veneer.

Residence to cost $4,800, Chapleau. Owner and builder, Petrus Forgues, 264 Hampton. 2-sty., 47 x 50, cement foundation, brick veneer construction.

Residence to cost $4,200. Brissette. Owner and builder, D. Legault, 77 Rielle. 3-sty., 24 x 36, brick construction. Excavation started.

Residence to cost $4,000, St. Hubert. Owner and builder, E. Ladouceur, 2735 St. Hubert. 3-sty., 60 x 25, stone foundation, brick veneer construction.

Ottawa, Ont.

Residence to cost $15,000, Marlborough avenue, for T. A. Beament, Eden Blk. Architect, C. P. Meredith, 126 Sparks street. Mason, G. A. Crain, Clemow avenue. Carpenter, Alex. Christie, Kenniston Apartments. Plastering, Frank Hunt, 115 Arlington. Ptg. and glaz., W. Howe, 141 Rideau. Plmg. and htg., Holloway & Son, 373 Somerset St. Tinsmith, McFarlane & Douglas, 250 Slater street. Electric work, H. H. Saunders, 491 Metcalfe.

Apartment house to cost $35,000, Charlotte street. Owner and general contractor, A. H. Coplan, 736 Albert St. Architect, W. H. George, Castle Bldg. 4-sty., brick construction, stone foundation.

Residence, Lebreton street. Owner and general contractor, Wm. Gardiner, 333 Bell street. 2-sty., 18 x 34, stone foundation, brick veneer construction. Excavation started.

Residence to cost $9,000, Clemoa Ave., for Weldon J. Graham, 90 Sparks street. Architect, A. L. Weeks, Sparks street. General contractors, Shuttleworth & Black, 24 Euclia street. 2½-sty., 32 x 41, stone foundation, brick veneer construction.

Portage la Prairie, Man.

Residence, cost $25,000, for Hon. Hugh Armstrong, Provincial Secretary. General contractors, Ritchie & Watters. 2½ storeys and basement, pressed brick and concrete construction.

Quebec, Que.

Apartment house to cost $25,000, for Louis Morency, Rue St., Mathias. Architect and general contractor, E. Cote, c/o owner. Iron and steel, Eastern Canada Steel & Iron Works, 508 Coristine Bldg., Montreal. Roofing, N. Barbeau, 36 Bridge street. Ptg., Gauthier & Freres. Htg., plbg. and electric work, O. Picard & Fils. 3-sty., 141 x 45, pressed brick construction.

Residence. Owner and general contractor Honore Paquet. 72 Morin street. Work being done by day labor. 3-sty., 42 x 60, pressed brick and structural steel construction.

Residence to cost $5,500, Latourelle, for Mr. Juneau, Latourelle street. Architect and general contractors, Latulippe & Belanger, c/o owner. 3-sty., 20 x 70, stone, frame and brick construction.

Residence for E. Lamontagne, Rue Arago. Builder and general contractor, Jos. Nadeau. Roofing, N. Barbeau, 36 Bridge street. Heating, plumbing and electric work, D. Boyte. 2-sty., 35 x 40, frame and brick construction.

Toronto, Ont.

9 pair residences to cost $40,000, Brookmount road. Builders, Waters & Elliott, 24 Vermont avenue. 2½-sty., stone foundation, brick construction.

Residence to cost $4,200, 444 Summerhill avenue, for Wm. Oakley, Toronto Lacrosse Club. Builder, A. A. Grant, 837 Logan avenue. 2½-sty., 23 x 34, brick construction and foundation.

Residences to cost $5,000, 44-46 Shanley avenue. Owner and builder, Builders Ltd., 403a Yonge street. Stone foundation, brick construction.

Residences to cost $12,000, Indian Rd. and Boustead avenue. Architect and builder, Wm. J. S. Tremaine, 486 Mountrose avenue. Stone foundation, brick construction. Plans drawn.

1 pair residences to cost $5,000, Garnock avenue. Architects and builders, A. & A. Grant, 837 Logan avenue. 2½-sty., 32 x 45, brick construction and foundation. ,

Residence for A. Matthews. General manager of Matthews Laing Co., Bathurst street. Architects, Burke, Horwood & White. 28 Toronto street. Mason, Rees & Hawkins, 69 Pauline avenue. Carpenter, Walker & Robertson, 309 Albany avenue. Roofing, Robt. Rennie & Son, 130 Dupont street. Ptg., F. G. Roberts & Co., 26 George street. Heating and plumbing, Purdy Mansell Ltd., 63 Albert avenue. Electric work, Geo. J. Beattie, 72 Victoria street. Plastering, R. C. Dancy. 171 Spadina road.

Residences to cost $5,400, S. S. Winchester street. Owner and builder, F. L. Beecroft, 170 Dowling avenue: Stone foundation, brick construction.

Residence to cost $4,500, 28 St. Andrews Garden street, for A. E. Covell, 319 Avenue road. Builder, Horace Maugnan, 48 Quebec avenue. 2-sty. and attic, stone foundation, brick construction.

2 residences to cost $9,000, Robiac avenue. Owner and builder, G. W. Johnston, 598 Crawford street. 2-sty., stone foundation, brick construction.

3 attached residences to cost $7,000, Bartlett avenue. Architect and builder, J. Drake, 87 Salem avenue. 2-sty., brick stone foundation.

Residence, Laxton avenue, for J. Guinane. 9 King street W., builder. Architect, Mallory & Thatcher, 31 Queen street west. Builder is owner. 2-sty., brick, stone foundation.

Vancouver, B.C.

Residence to cost $30,000, Shaughnessy Heights, for Dr. Brydone-Jack, 1946 Main street. Architect, Alexander & Brown, Fairfield Bldg. General contractors, Halloran Construction Co., 25 Hastings street E. Lathing and plastering. The Canadian & American Contracting & Investment Co. Ltd., 104 Empire Blg.

Apartment house to cost $200,000 for E. Cook, 155 Alexander street. Architect, W. M. Dodd, Bank of Commerce Bldg. General contractor, Cook Construction Co. Ltd., 2030 Beach. 6-sty., brick and concrete.

Residence to cost $10,000, Shaughnessy Heights, for G. C. Tunstall Jr., Thurlow and Nelson street. Architect, Maclure & Fox, Pacific Bldg. General contractor, Egdell & Dixon, 198 Hastings W. Carpentry, Western Sash & Door Factory. Plumbing, H. S. Jones, 1399 7th avenue west. Plastering, Jas. S. Woods. Painting, Stewart & Hughes, 2-sty., frame and stone construction.

Residence to cost $6,000, 2485, 8th avenue west. Owner and general contractor, J. E. Atkins, 604 Bower Bldg. Architect. P. M. Julien, c/o owner. 2-sty., frame construction.

Bungalow, cost $5,000, Shaughnessy Heights, for A. J. Dunlop. Architects, Doctor, Stewart & Davie, Arts & Craft Bldg. Concrete foundation, frame construction.

Residence, cost $5,000, 1055 14th ave. west, for J. Robertson, 321 Cambie. Architect, S. A. Pelle. General contractor, J. & G. Watt. Two storeys, frame construction.

Residence to cost $20,000, Shaughnessy Heights, for Mr. Justice Morrison, 1050 Jervis street. Architect, Maclure & Fox, Pacific Bldg. General contractors, Egdell & Dixon, 198 Hastings W. Carpenter, Alberta Lumber Co., 790 6th avenue west. Excavating, Brooks & Weisdepp, 310 Lansdowne W. Seattle paving brick foundation. frame and roughcast construction.

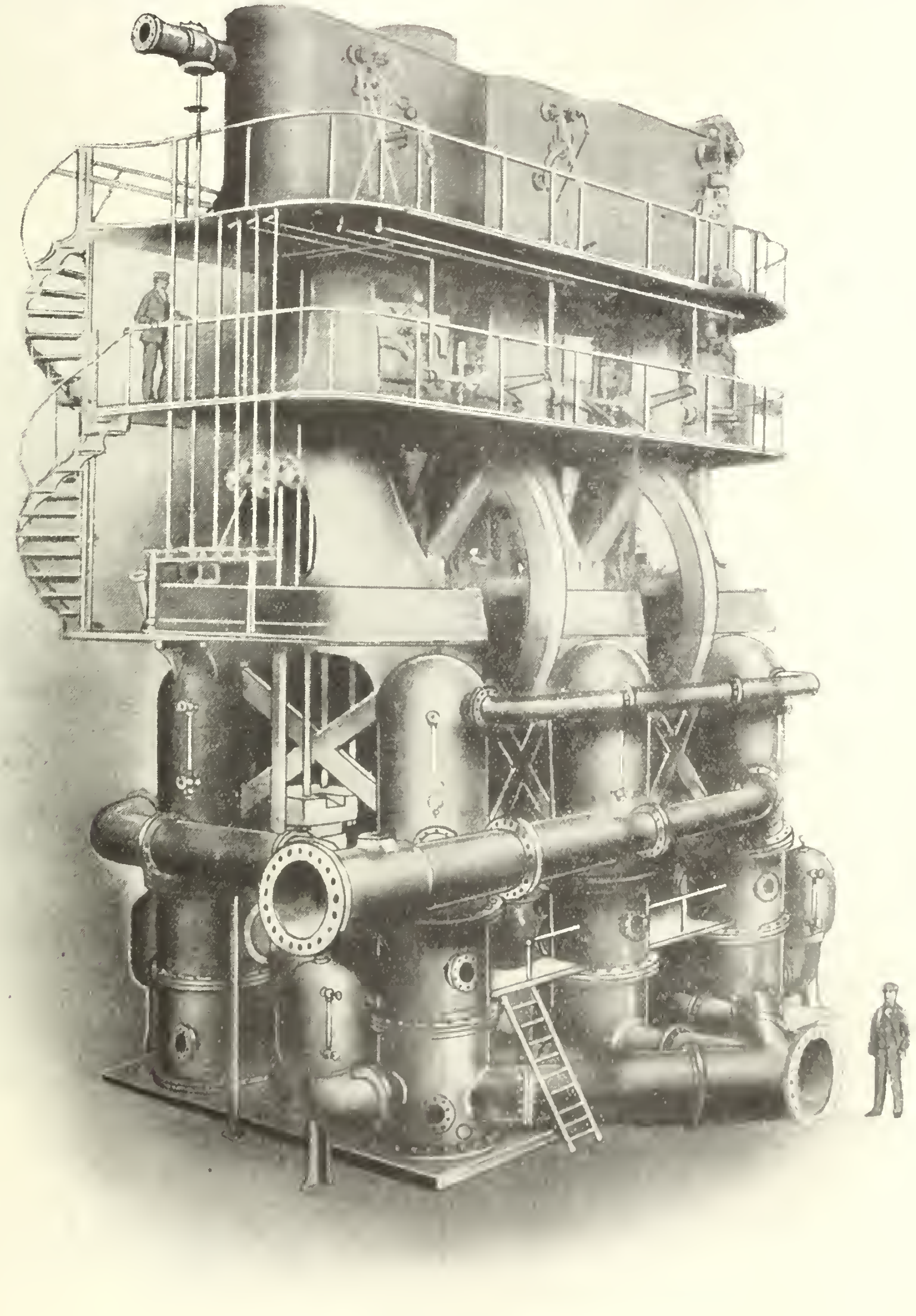
Winnipeg, Man.

Residence, cost $20,000, Central street, for J. F. Shiers. Architects and general contractors, Claydon Bros., 444 McMicken street. 2½ storeys, 40 x 60, concrete foundation, stone and brick construction.

Residence to cost $5,600, for Dr. C. C. Field, 560 River street. Architect, P. C. Samwell, 516 Builders Exchange. General contractors, Fraser & Falconer, c/o architect. Ptg., Andrew Stein, 620 Young street. Heating and ptg., R. J. Wallace, c/o architect. Electric work, Electric Construction Co.. 136 Rupert street. Plaster, J. D. McDonald.

Residence, cost $9,000, Oxford street, Mrs. W. W. Watson, Kildonan, Man. Architect, Wm. Fingland, 334 Portage ave. General contractors. Fraser &

WATER WORKS PUMPS



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Faulkner, c/o architect. 2½ storeys, 31 x 35, stone foundation, frame construction, shingle roofing. Excavation started.

Apartment Block, cost $30,000, Spence street, for Coaffice & Martin, Endorton Block. Architect, Wm. Fingland, 334 Portage ave. General contractors, Fred Lewis Co., 603 MacMillan Bldg. Three storeys, 46 x 80, brick, stone foundation.

Power Plants, Electricity and Telephones

Fort William, Ont.
Gas lighting. A special committee of the council are considering the question of a gas franchise. Clerk, Alex. McNaughton. Engineer, Jno. Wilson.

Hamilton, Ont.
Gas mains. The Ontario Pipe Line Co., Sun Life Bldg., will construct gas mains across Beach.

Kamloops, B.C.
Addition to lighting system, cost $65,000. Clerk, J. J. Garment. Consulting engineers, Dutcher Maxwell & Co., 319 Pender street west, Vancouver, B.C. By-law passed.

Milton, Ont.
Lighting system. Town council is having plans prepared. Clerk, G. A. Hemstreet, Milton West.

Oak Lake, Man.
Power house for Leitch Bros.' Flour Mills Ltd. Machinery required. Plans in progress.

Paris, Ont.
Electric power, cost $5,000. Town council contemplate installing. Clerk, Thos. McCosh. By-law to be submitted on October 3rd.

Port Alberni, B.C.
Electric lighting plant. Consulting engineers, Warten & Wilkins, William Bldg., Vancouver, have been instructed to prepare plans, also to estimate cost of plant and distribution system.

Port Dover, Ont.
Gas piping. Town council contemplate issuing franchise to the Dominion Natural Gas Co., James street, Hamilton, to pipe to the town and to pipe the town for gas supply. Clerk, James Sloane.

Sherbrooke, Que.
Electric power house for Canadian Ingersoll Rand Co. General contractors, Sherbrooke Construction Co. Iron and steel work, McKinnon Holmes & Company. Brick and steel construction.

Sussex, N.B.
Steam plant. Town have placed order with general contractors, E. Leonard & Sons, for a brick set 80 h.p. boiler, also a National Feed Water Heater 50 h.p. to operate spare steam pump. Engineer, C. D. Mills.

Toronto, Ont.
Power plant and generating house, etc., Mutual and Dalhousie streets, for Consumers' Gas Co. General manager, Arthur Hewitt, 19 Toronto street. Architects, Burke, Horwood & White, 28 Toronto street. Mason, J. A. Wickett, Ltd., 77 Victoria street. Two storeys, brick foundation and construction, maple and pine finish.

Winnipeg, Man.
Lighting system for Arlington street bridge, cost $4,175. Clerk, M. Peterson. Electrician, E. F. Cambridge. General contractors, Mitchell Gray Electric Co., 259 Smith street.

Miscellaneous

Dundas, Ont.
Fire apparatus. The Town Council will purchase new hook and ladder equipment and truck for fire brigade. Mayor, E. A. Woodhouse. Clerk, J. S. Fry.

Leamington, Ont.
The town council contemplate purchasing additional chemical apparatus, etc. Clerk, R. M. Selkirk.

Scott, Sask.
Fire apparatus. 1,000 ft. of fire hose with couplings and nozzles complete. Tenders received by Sec.-treas., James N. Forrest, until October 7th.

St. Laurent, Que.
Fire apparatus for Municipal Council. General contractors, Lymburner & Mathews, Commissioners and Berri Sts., Montreal. Hose, harness, fixtures, etc.

Kingston, Ont.
The Robert Fulter Manufacturers of Philadelphia, have made an offer to the Civic Utilities Committee to erect and equip a filtration plant to care for city's water supply for $54,000. The proposition will be considered.

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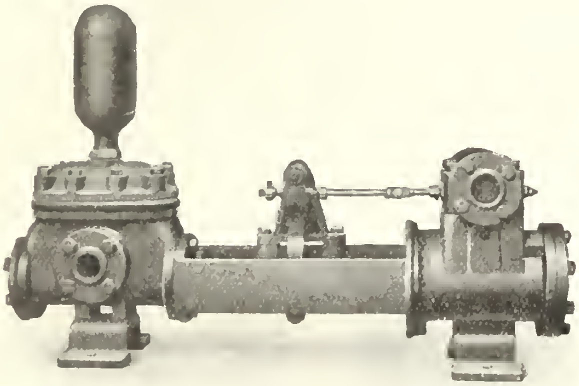

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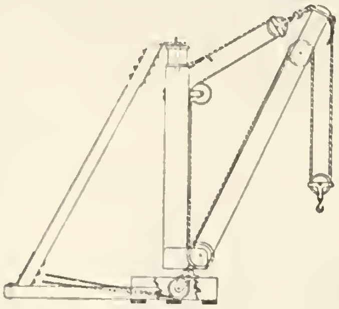

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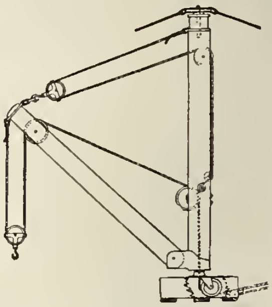

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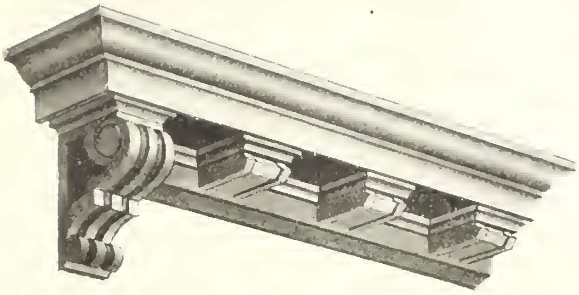

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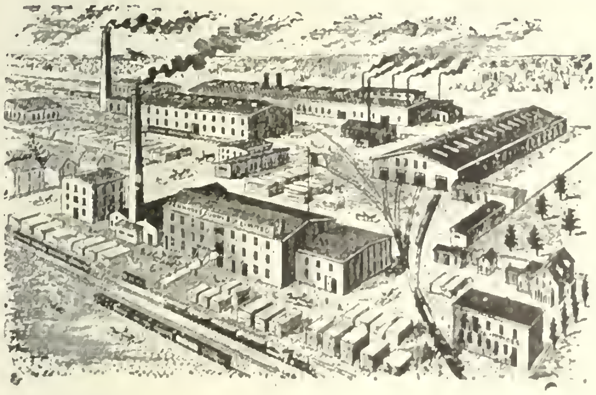

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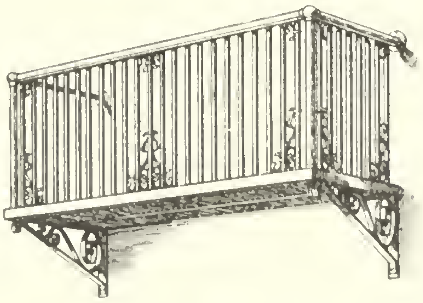

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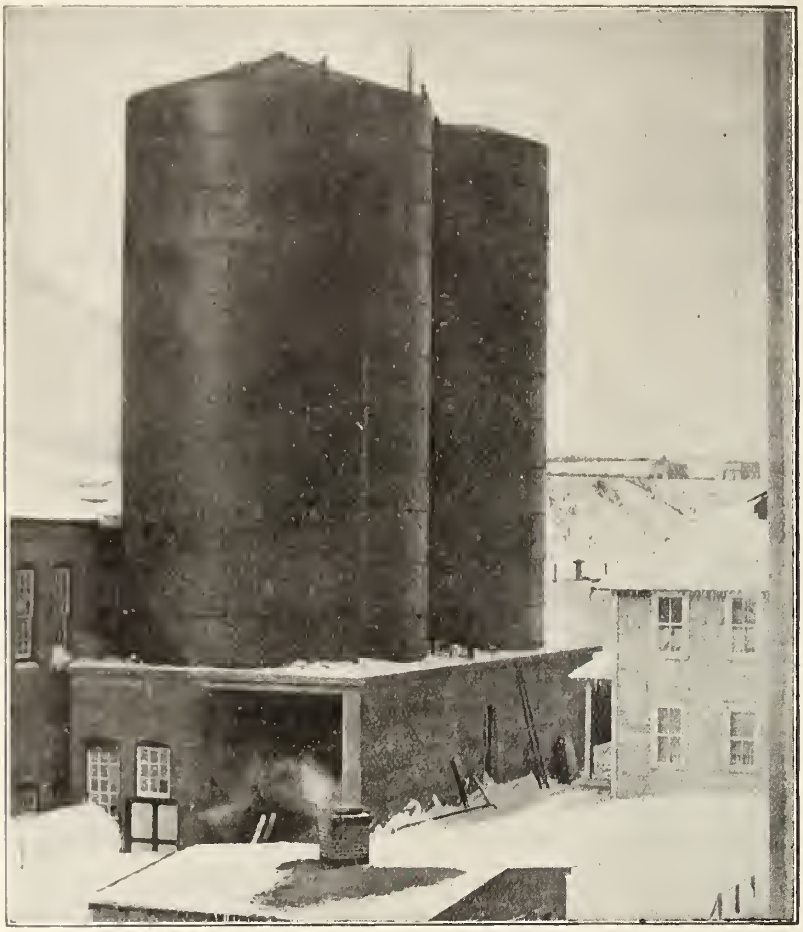

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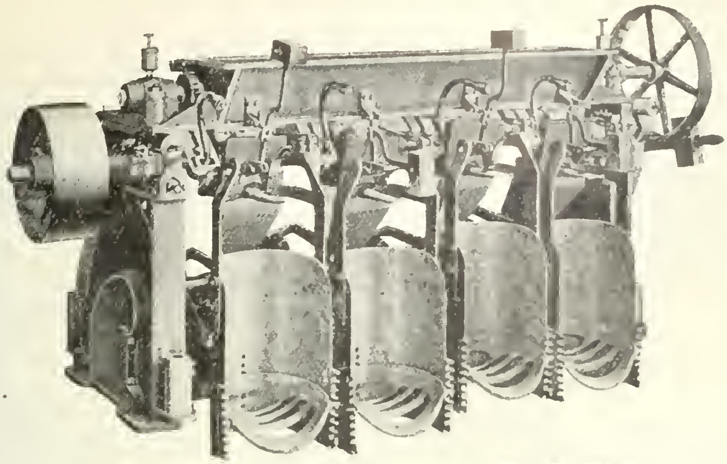

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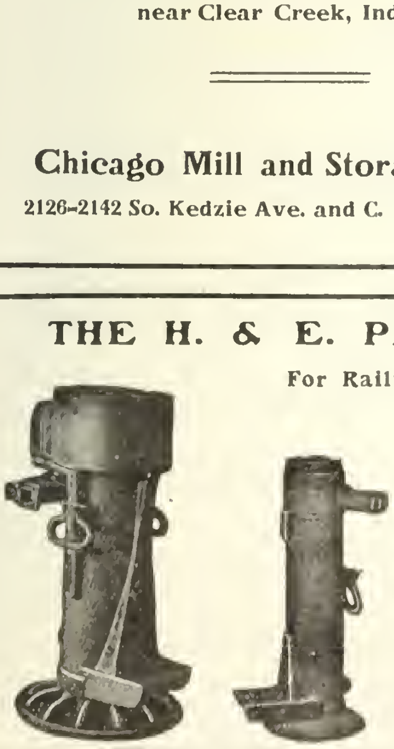

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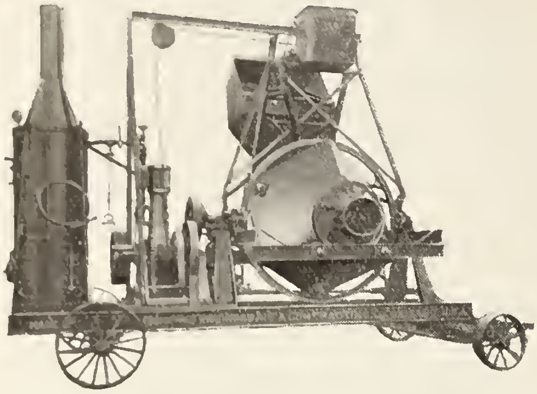

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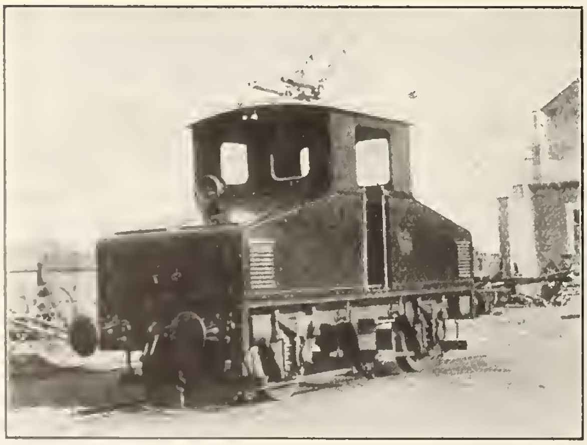

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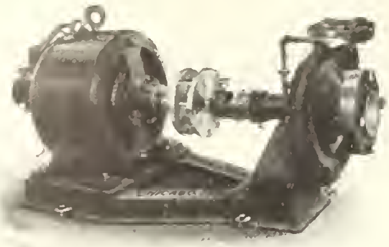

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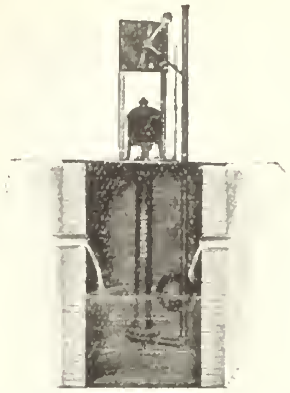

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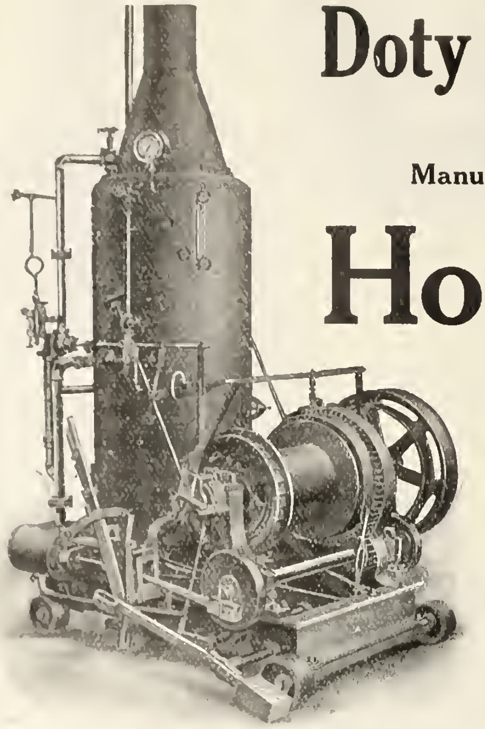

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Architect, Owner and Builder Before the Law, by T. M. Clark. Published in 1905 by The MacMillan Company, New York. 387 pages. Price $1.00,

Properties of Steel Sections, by John C. Sample, C.E. Published in 1905 by McGaw Publishing Company, New York. 121 pages, illustrated. Price 50c.

American Renaissance (A Review of Domestic Architecture), by Joy Wheeler Dow. Published in 1904 by William T. Comstock, New York. 182 pages, illustrated. Price $1.00.

Modern Plumbing, illustrated, by R. M. Starbuck. Published in 1907 by Norman W. Henley Publishing Company, New York. 329 pages, illustrated. Price $2.00.

Reinforced Concrete, by A. W. Buel. Published in 1906 by the Engineering News Publishing Company, New York. 500 pages, illustrated. Price $1.00.

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The Sanitation of a Country House, by Dr. Harvey A. Bashore. Published in 1905 by John Wiley & Sons, New York. 98 pages, illustrated. Price 50c.

Modern Cement Sidewalk Construction, by Charles Palliser. Pub-B. T. Batsford, London. 776 pages, illustrated. Price 50c.

Stones for Building and Decoration, by George P. Merrill. Published in 1903 by John Wiley & Sons, New York. 540 pages, illustrated. Price 50c.

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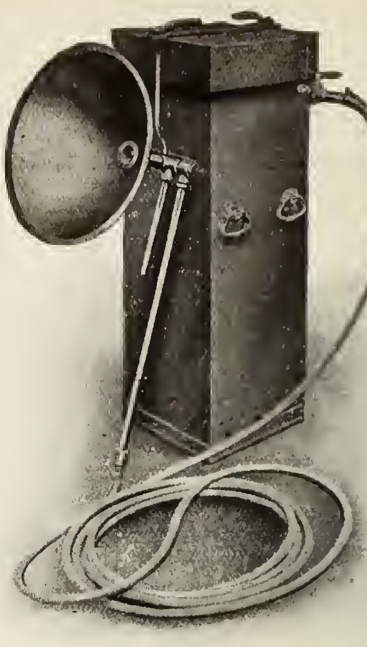

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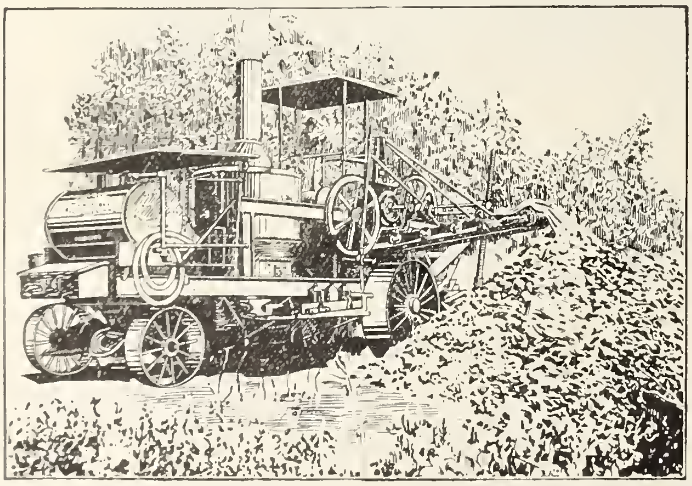

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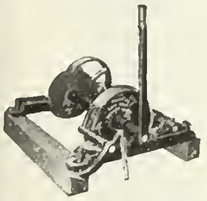

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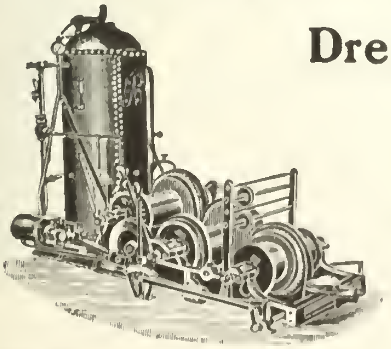

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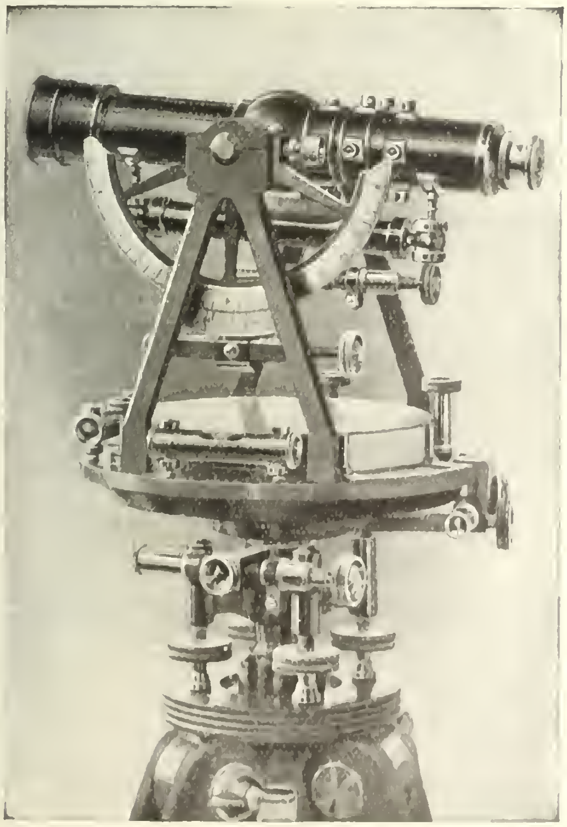

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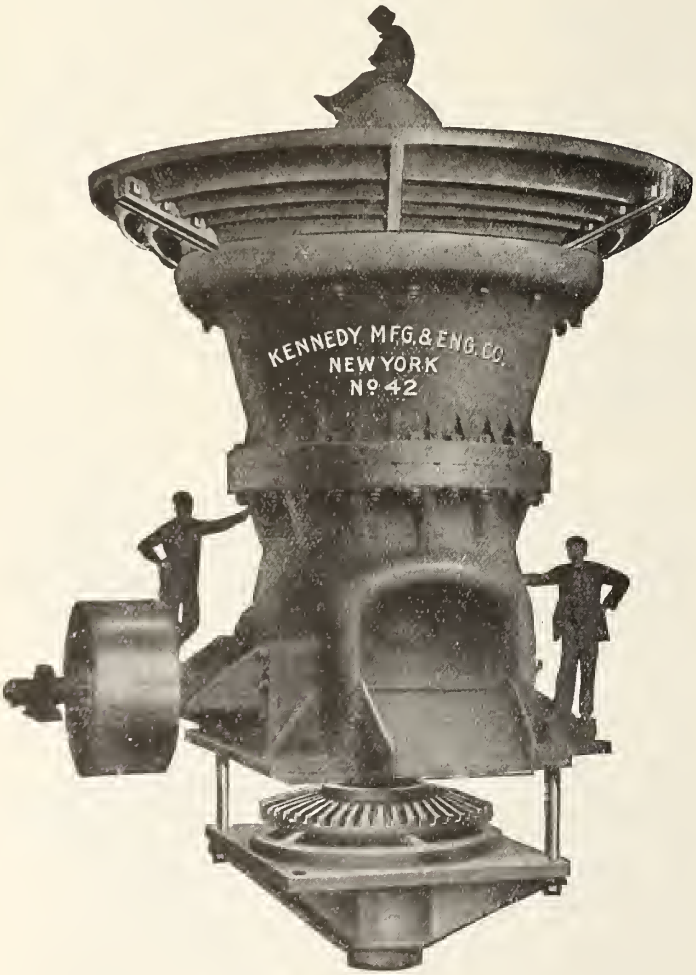

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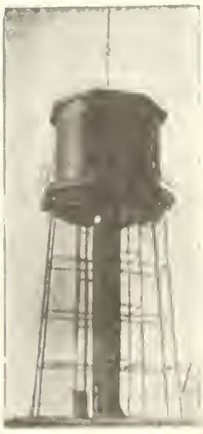

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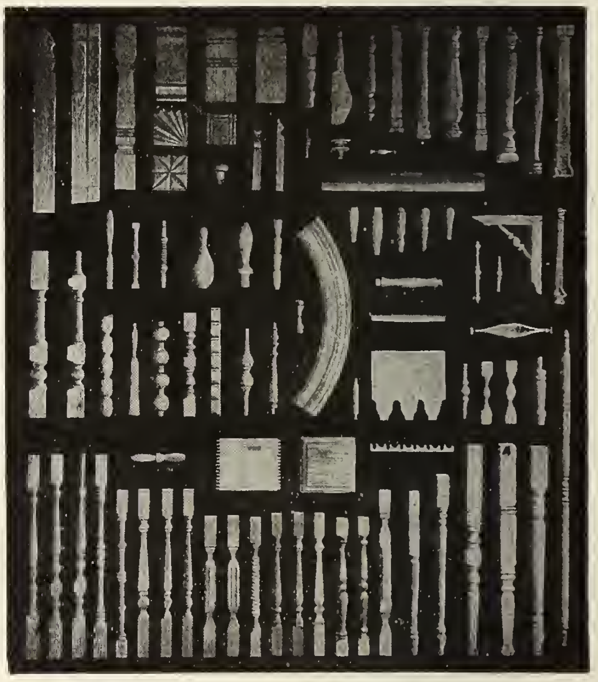

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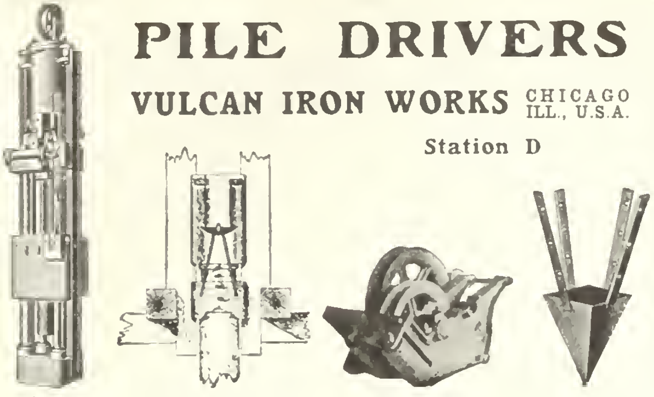

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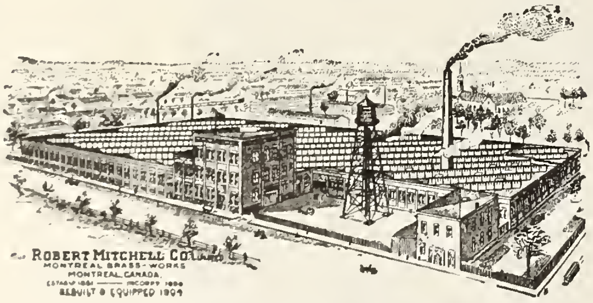

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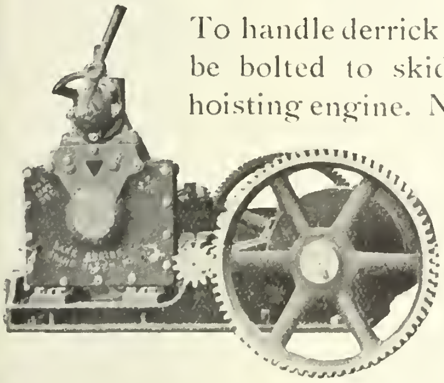

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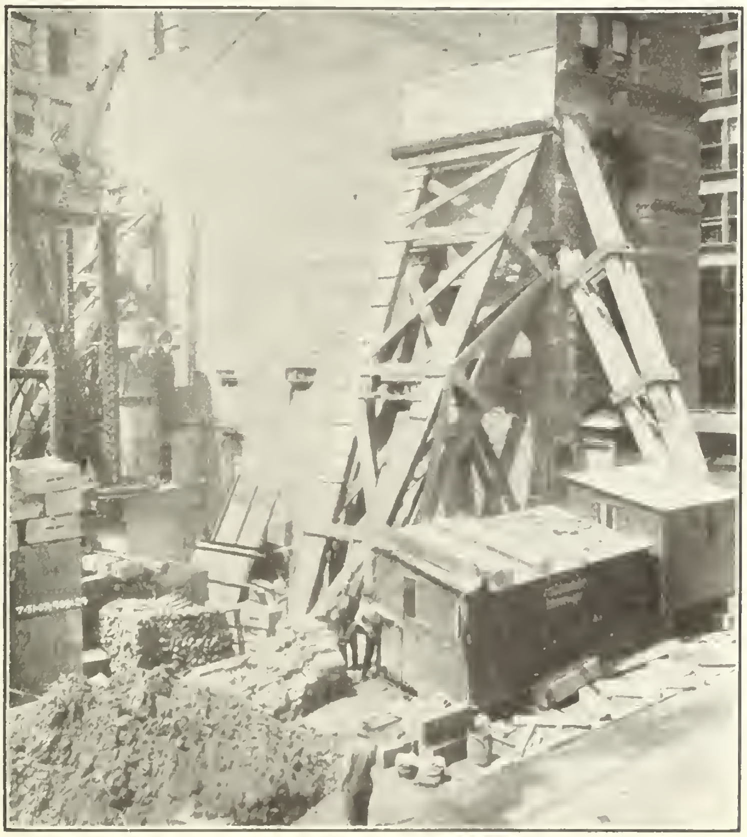

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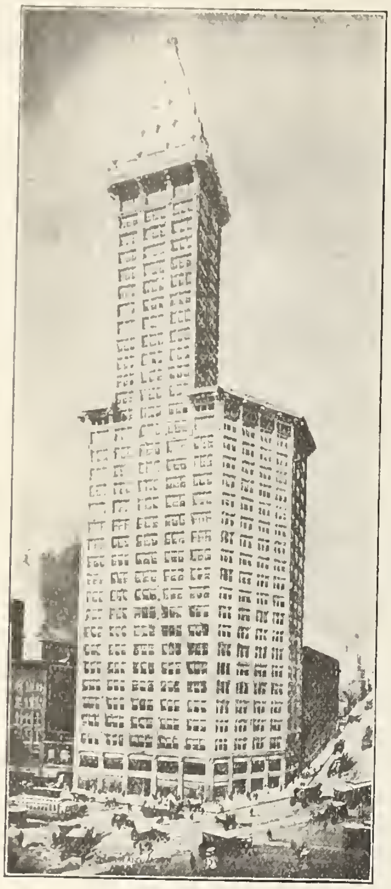

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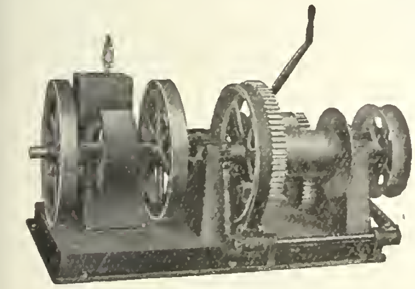

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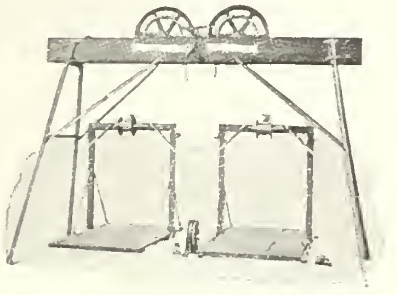

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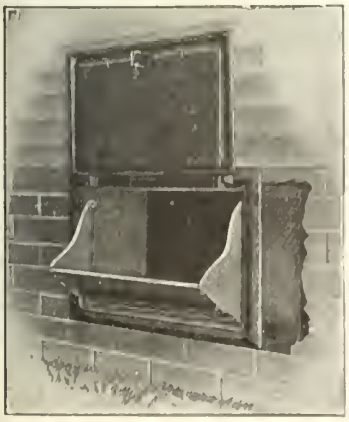

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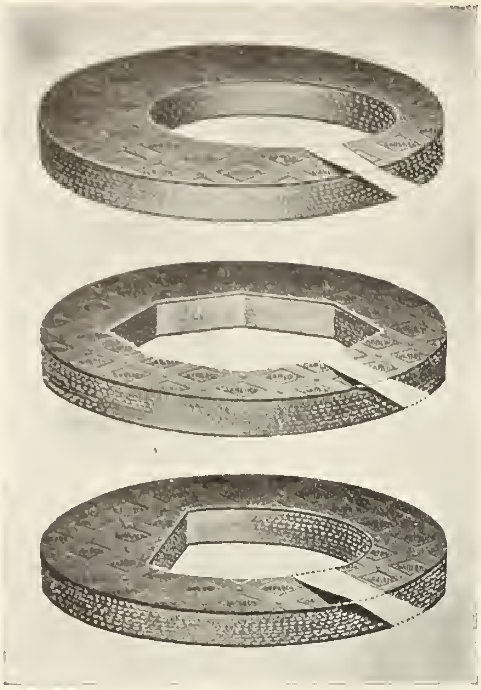

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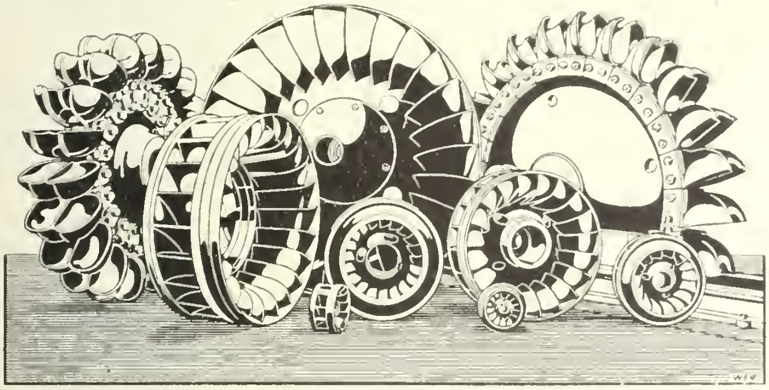

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Whether the concrete wall be six inches or six feet thick, it is waterproofed throughout the entire mass.

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"Ceresit" Waterproofing is guaranteed as an effective, permanent water repellant for all sorts of concrete construction, such as tunnels, foundations, reservoirs, dams, swimming pools, viaducts, aqueducts, bridges, sewers, water tanks, water towers, cellars, walls, floors, boiler pits and roofs. Ceresit waterproofing is equally efficient as a dampproof and waterproof for cement mortar on concrete, brick, tile or stone; also on cement stucco and exterior finishes for residences. **Please write for free book "F"** and try Ceresit waterproofing on your next job, Ceresit is used in all civilized countries. Ceresit is catalogued in Sweet's Index.

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as a foundation for wall tile. A base that may warp would never do.

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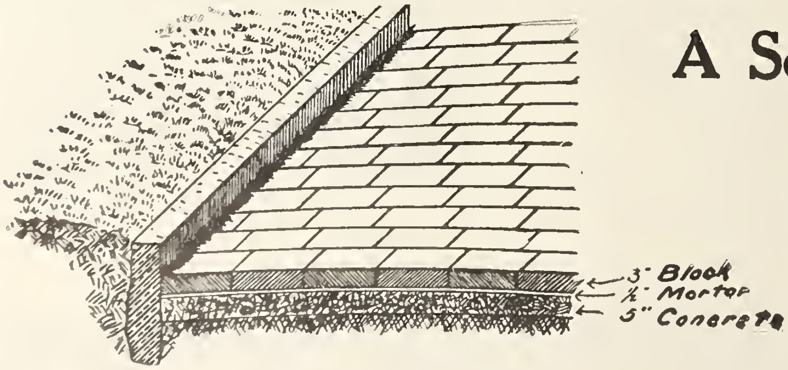

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Wire cut bricks for foundation work	11 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

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Hemlock Lumber—		
2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00
Pine –		
1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pnie Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving..	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	
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4 in. casing per 100 ft.	2 00	
5 in. casing per 100 ft.	2 25	
8 in. pine base, per 100 ft.	3 25	
10 in. pine base, per 100 ft.	4 25	
1 in. pine window stool	2 75	
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XXX B. C. Clear Shingles, per M.	3 60	
X. B. Extras	3 50	
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No. 1 pine lath, per M.	4 75	
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5 in. at small end, each	25	
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Hemlock lath	3 25	

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Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 per cent, for approved specifications:—

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7 00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		21.00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$3 25	$4 75
40	3 45	5 20
50	3 85	6.00
60	4 10	6 50
70	4.35	7.00
80	4.85	7.50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

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	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

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Lead pipe, $7.85 net; lead waste, $9.35 net; caulking lead, 5½ cents. per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

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Size (per 100 ft.)	Black		Galvanized
¼ inch	$1.93	¼ inch	$2.75
⅜ "	1.93	⅜ "	2.75
½ "	2.55	½ "	3.19
¾ "	2.99	¾ "	4.14
1 "	4.29	1 "	5.94
1¼ "	5.85	1¼ "	8.10
1½ "	7 02	1½ "	9.72
2 "	8.82	2 "	12.12
2½ "	14.09	2½ "	19.84
3 "	18.50	3 "	26.05

Malleable fittings Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 70; nipples, 4-inch diameter and under, 80; nipples, 4½-inch and up, 75; malleable lipped unions, 65 and 10 per cent.

Plain steel bars, $2.05.

Square twisted bars, ¼ to 1 in., $2.15.

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Medium and extra heavy pipe and fittings, up to 6 inch, 70 per cent.

7 and 8 inch pipe, 50 per cent.

Sewer Pipes

4 in ...	25c ft	15 in	1 35 ft
6 in ...	40c ft	18 in	1 90 ft
9 in ...	65c ft	20 in ...	2 25 ft
12 in	1 00 ft	24 in	3 25 ft

all less 60 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.80.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.55.

Crushed stone, 2 inch, $1.30; 1 inch, $1.35; [illegible] inch, $1.15.

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Sand, fo: cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and heads, in the rough, delivered, 40 cents per foot.

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Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, 9.00 in car lots.

Lime, per cwt., delivered, not less than 1,500 lbs., 33 cents; white, 43 cents.

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Pure White Lead, ground in oil, $9.00 per 100 lbs.

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Pure Red Lead, dry, $7 to $8 per 100 lbs.

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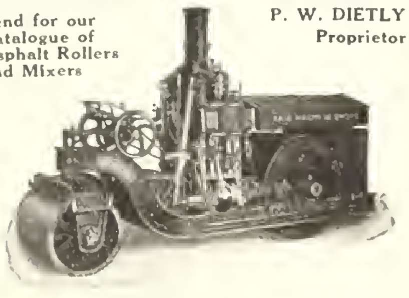

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Established 1882
THE COMMERCIAL
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Let us write your water-proofing and damp-proofing specifications and relieve you from the annoyances incident to the use of inferior products. Backed by 15 years experience in handling water-proofing problems we are equipped to give you the best materials obtainable at a nominal cost.

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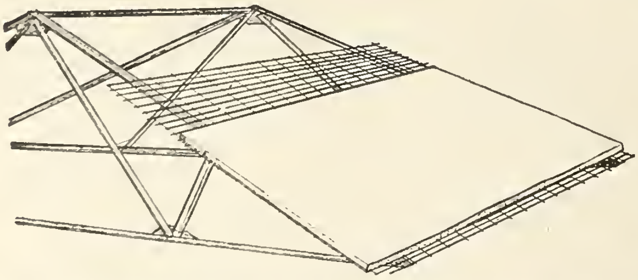

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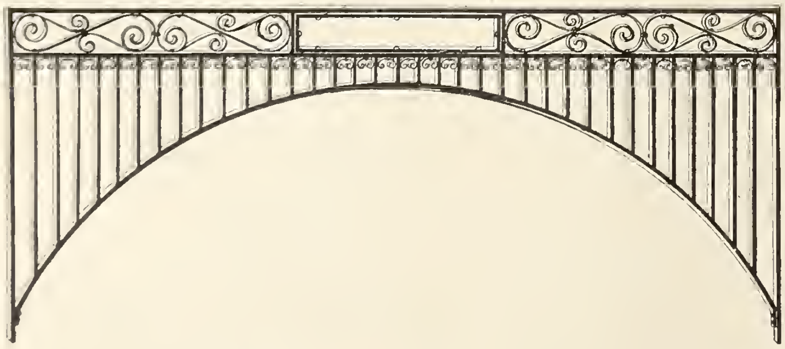

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Our Scrapers are the leading Drag Scrapers everywhere. All our Scrapers are absolutely seamless throughout and are superior to any others upon the market.

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ESTABLISHED 1886

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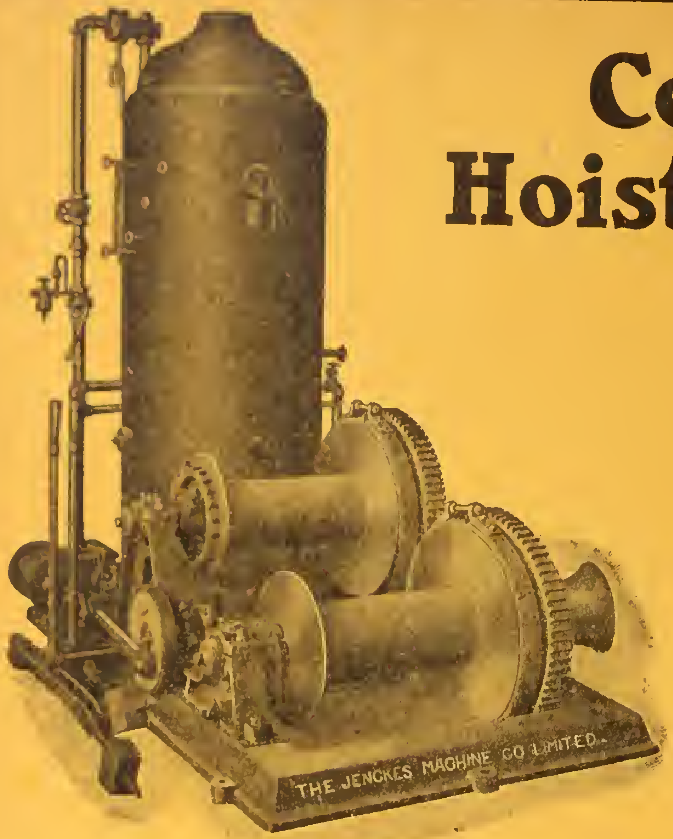
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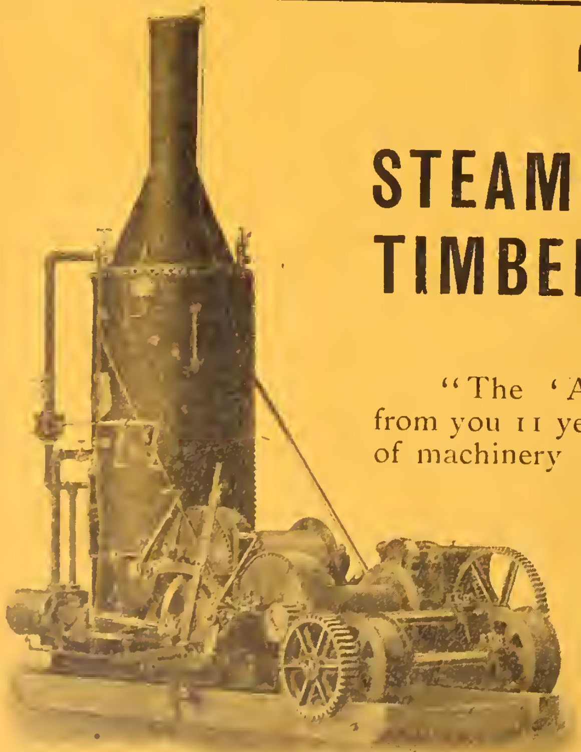

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"It has been in constant daily use with less than 10 dollars' worth of repairs
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The cost of keeping a mile of macadam road in good condition for one year will pay for the maintenance of 166⅔ miles of concrete road for same period.

The first concrete road was built in Bellefontaine, Ohio, nineteen years ago. The cost of maintenance has averaged **$6 per mile per year.**

Six years ago New York State started to build 12,000 miles of macadam road. Fifty million dollars was voted for the work. To date, 3,674 miles have been improved, and $49,000,000 has already been spent—or over $13,000 a mile—and the present cost of maintenance, only six years after the first mile was built, is **$1,000 per mile per year.**

Is it any wonder that the New York Road Commission, in asking for another fifty millions, has promised the people to spend it for concrete highways?

Wayne County, Michigan, has built 33 miles of concrete roads since 1909, and the farmers of Wayne County are so well satisfied that they no longer consider macadam roads.

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The engineers of our Free Information Department will gladly supply any information on concrete highways that is desired, without cost or obligation to the enquirer.

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Safety Extensible Trench Brac

May be utilized on
any width of Trench

NOTE—
The Lug on
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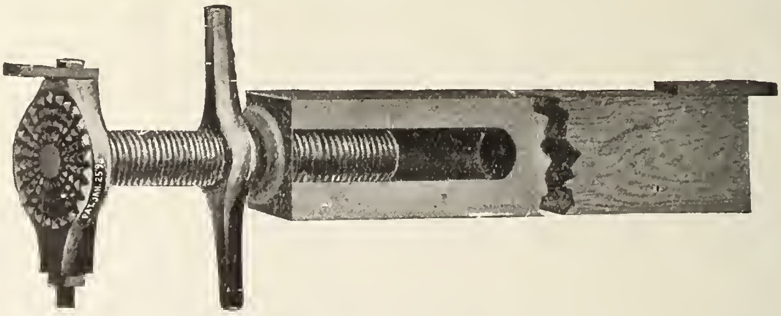

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Particularly useful on Heavy
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-Shaped Cars in all Sizes, from 9 cubic feet
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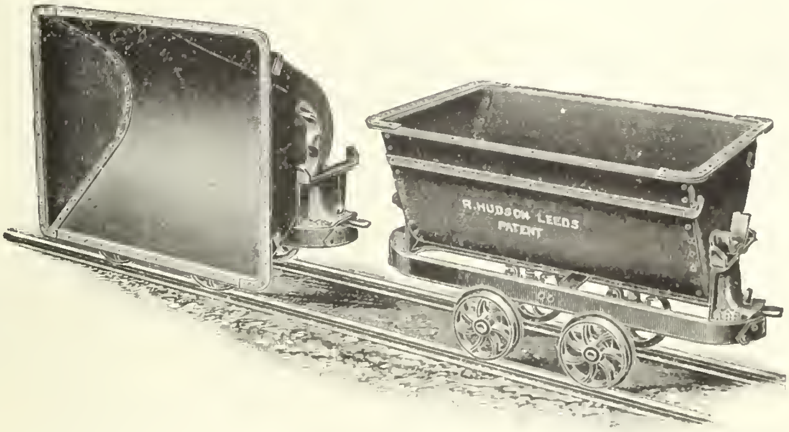

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All Cars fitted with Cast Steel Wheels, with Patent Dust-proof Caged Roller Bearings and Steel Springs.

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Steelcrete Steel Lockers are finished in olive green enamel and are exceptionally **neat** in appearance, **clean and sanitary,** and **solid** as a block of wood. They are constructed throughout of the finest high-grade steel and are unequalled for their Strength and Rigidity.

The Standard Sizes and fittings, etc. are carefully calculated to meet every ordinary requirement.

Made in "Single Tier" or "Double Tier" with sheet steel or expanded metal (open mesh) doors—combination locks or padlocks instead of rim locks if desired.

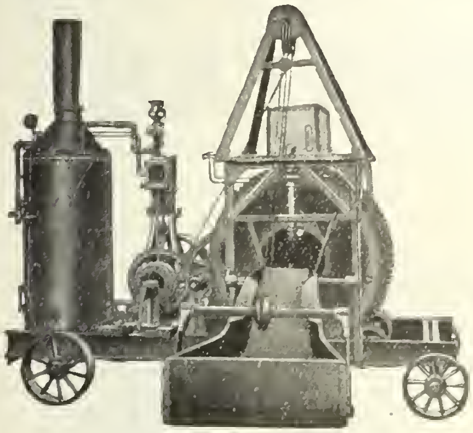
Write to Us—Our Prices will Interest You

STEEL and RADIATION, Limited

TORONTO, CANADA

London Concrete Mixers

are built in Many Styles and Sizes



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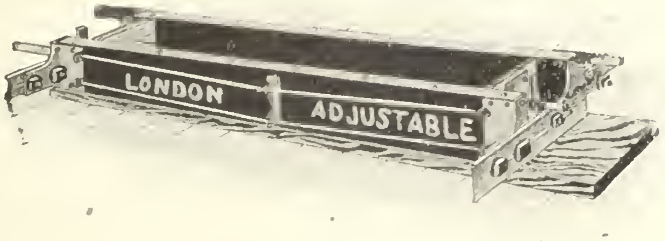
The MANY NEW and IMPROVED features of the LONDON MIXERS appeal to the contractor.

London Automatic Batch Mixer No. 2

The Enormous Sale of those machines is sufficient proof as to satisfaction they are giving. Everything made in our own shops.

Every machine HIGH GRADE

Every machine sold under a STRONG GUARANTEE



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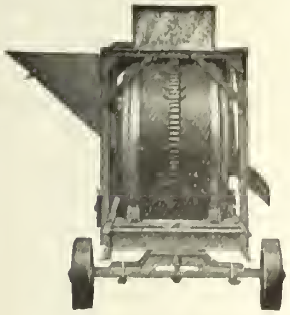
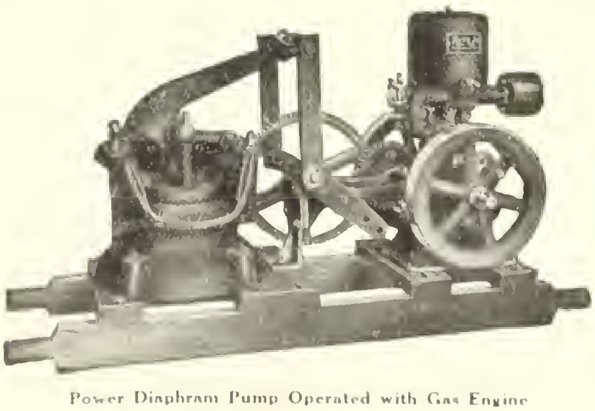


London Standard Drum Batch Mixer

WE ARE THE LARGEST MANUFACTURERS OF CONCRETE MACHINERY IN CANADA. That is why we can sell at such remarkably low prices.

Producing in large quantities reduces the cost of production.



Power Diaphram Pump Operated with Gas Engine

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You Can't Go Wrong

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The Heartshape Drum Gives a Positive Mix and a Clean Dump

Strongly constructed and *automatically controlled* this mixer will economise in time and labor right along—it will save you money on every day's work it does, and will give the most satisfactory every-day working service it is possible to obtain in Concrete Mixers.

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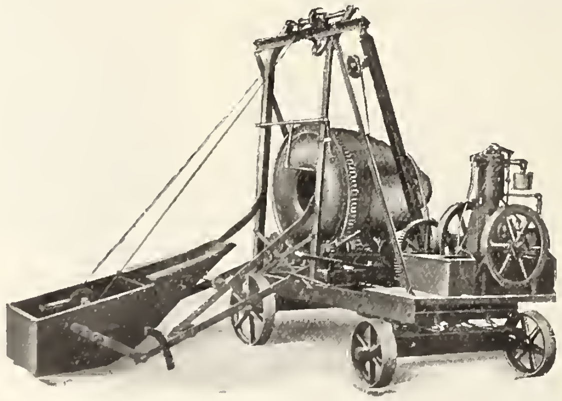

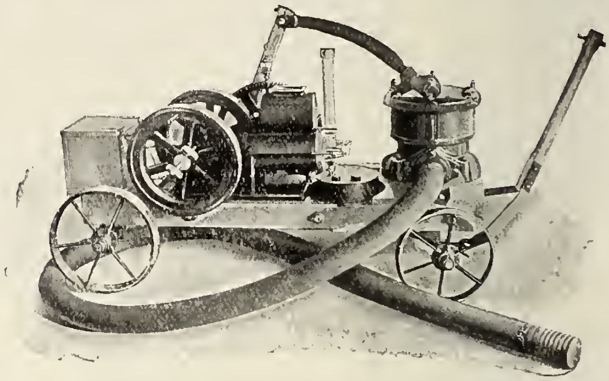

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on a job by using hand pumps—for every day's work, your hand pumps cost you $5.00. Here is a pump that will pump out your abutments and foundations, or any place where you are troubled with water, at an average rate of 2,000 gallons per hour—does *more* than the work of *two men* at a cost of *not more* than *35c. a day*—that is a direct saving of time, labor and money—a saving that will very soon pay the cost of the pump.

Get away from the old hand pumps—avail yourself of the advantages of modern methods—save money and at the same time possess an up-to-date equipment.

No contractor should be without one of these pumps.

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The most perfect system of concrete reinforcement on the market. Expanded Metal Cold Drawn—gives maximum stiffness, strength and high elastic limit.

ROGERS

Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

All

Fire Proofing Material

used by the

Building Trade

supplied by

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28 King St. W., TORONTO, Ont.

N. J. Dinnen & Co.

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WINNIPEG

Man.

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery — Send your orders for crushed stone to

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French Caen Stone Cement

Monarque Brand and Cementaline. Rich in appearance and of unlimited durability, as good as natural stone—but cheaper. Full particulars of

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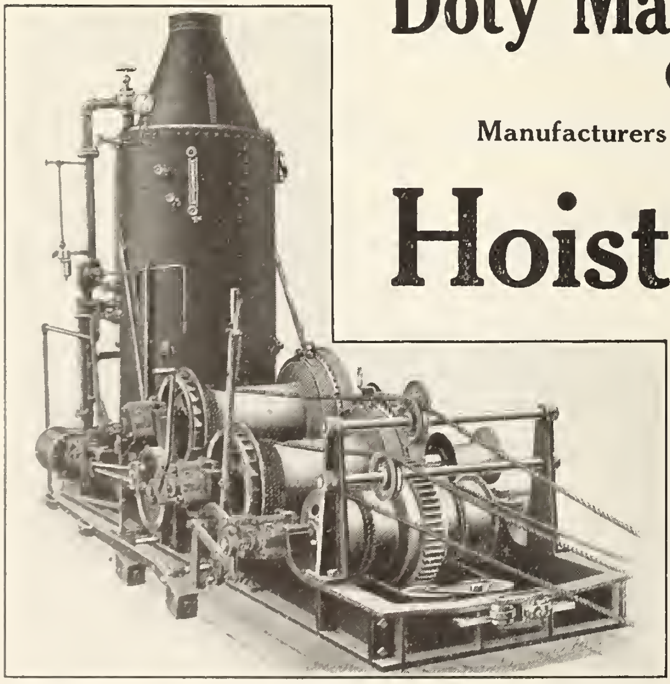

This cut illustrated our Standard Double Cylinder Double Drum Hoisting Engine with Derrick Swinger attached. "Superior to any other on the market." All parts constructed, guages and templates and every engine tested under steam.

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Company Limited
Manufacturers of **Superior**
Hoisting Engines

Derrick Swingers, Material Elevators, etc.
for
Contractors, Mines and Quarrymen

A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

Works—GODERICH, ONT.

To buy our Engines is a Guarantee of Satisfaction

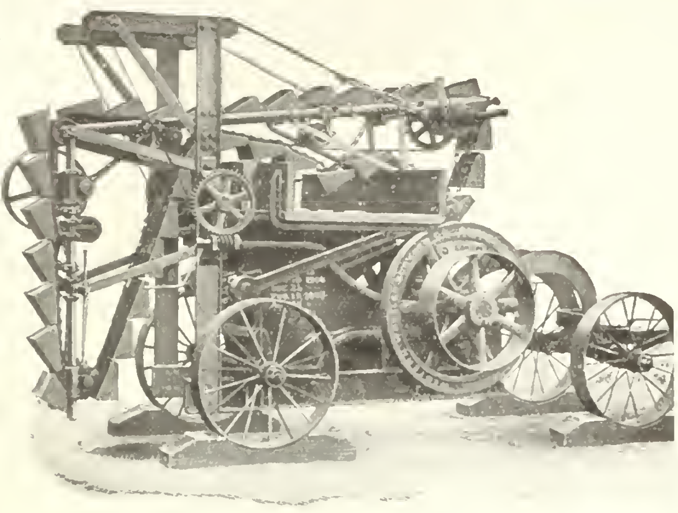
Sawyer Belts are Stitched Straight and True

They run true on the pulleys. The more rows of stitching—the stronger the belt. Sawyer Canvas Belt has a row for every quarter inch of width.

Write for Book No. 3

Sawyer Belting Company

CLEVELAND, OHIO.



Steel Castings and No Lost Motion

forged steel yoke, cross bars on yoke remove all strains from main frame, moving jaw given a compound oscillating and reciprocating motion so that crushing is **continuous**, are features of the

Aurora Steel Rock Crusher

Its compact form combines great strength with light weight, making it very portable, and **specially adapted for contractors' use.** Strongest and most durable crusher on the market combining maximum product with minimum power. Adjustable to various sized stone. *Get our Special Crusher Catalog*

WESTERN WHEELED SCRAPER CO.

Earth and Stone Handling Machinery. **Aurora, Ill.**

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS

1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

Total $376.17 or 5⅔c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting

Hagersville, Ont.

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"PIONEER"
ASPHALTS

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Highest Quality
ASPHALTS
TRADE MARK

The 16 year record of "PIONEER" ASPHALTS is the best assurance an Engineer can have as to their efficiency, permanency and economy. Specify "PIONEER" ASPHALTS

For Asphalt Macadam Roads, Asphaltic Concrete, Sheet Asphalt Paving and Filler for Brick and Block Pavements

and results will be highly satisfactory. "PIONEER" ASPHALTS are 99.5 per cent. pure bitumen. They are waterproof and weatherproof. Can be used for all purposes where an asphalt can be used.

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THE CANADIAN MINERAL RUBBER CO., Ltd.

Canadian Express Building, MONTREAL
503 Canada Building, WINNIPEG

Tarvia

Preserves Roads
Prevents Dust~

Section of Government Parkway, Ottawa, Canada, treated with Tarvia B

The Property Owner's Investigation

IN the City of St. Thomas, Ont., the property owners on Gladstone Avenue contemplated petitioning the City Council to improve the roadways. They commissioned one of their number to visit various American cities, inspect pavements and make a report. Their investigator, Mr. E.A. Horton, visited various cities in New York and New Jersey. In his report he made the following statements:

> "I saw a 'Tarvia X' road in Rochester which extends from the city to the lake front, a distance of about six miles. It had been in use for eighteen months, and when I saw it, it was in excellent condition, with heavy traffic over it every day. I........inspected a piece of road in Newark......the surface when finished was smooth, and to my mind was one of the finest pieces of road it was my privilege to see. We then inspected another piece of "Tarvia X" which had been done by the Road Commission two years ago Constant heavy traffic passes over this road every day, and trucks have loads of from 6 to 8 tons. Steel-tired drays were used with most of their heavy traffic. This piece of road, as I saw it, did not show any wear whatever, and was apparently in as good condition as when it was put down
>
> "I did not confine my attention to Tarvia roads as I saw (here he mentioned five of the commonest types of road treatment) and every other kind of road that is known.
>
> "I must say after making enquiries from people who were in no way interested, nor did they know I was seeking information, that everyone had a good word to say for the Tarvia road I have no hesitation in recommending it for use on our street, and at the estimate cost that has been given us, after seeing the many pieces of road that I have seen, I think it is the cheapest road that can be built"

The foregoing is quoted from the St. Thomas, Ont., Journal on February 20th, 1912. Since that date Gladstone Avenue has been constructed with "Tarvia X."

Anyone who will investigate the road problem with the same thoroughness will reach similar conclusions Tarvia is made in three grades

"Tarvia X" for use in constructing roads and pavements.

"Tarvia A" for hot surface applications

"Tarvia B" (applied cold) for dust prevention and road preservation.

Booklet describing the latest developments in methods for building tarviated roadways and pavements will be sent free on request Address our nearest office

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MONTREAL TORONTO WINNIPEG VANCOUVER

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150 Types and Sizes

Always a Full Load

We now have Priestman Grabs in stock in our Montreal Show Room. They may also be seen working on the St. Lawrence River.

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In Water Meters

Means Just This:

Accuracy, uninterrupted service, without frequent and expensive repairs and the application of the right principles of construction and operation to specific needs.

Let us tell you something of the efficiency of our Water Meters and the various types which we manufacture

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Manufacturers of the well-known

TRIDENT Frost-Proof Water Meters

Write for Catalogue

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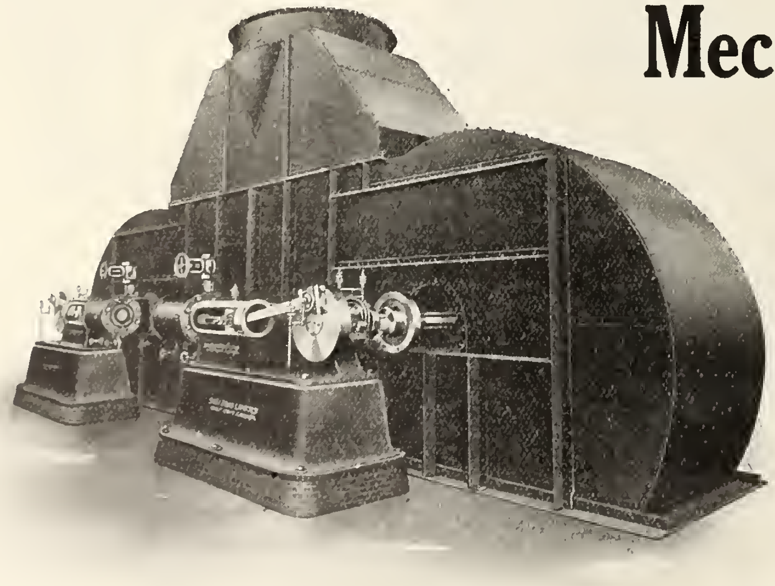

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- Higher Efficiency
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- Cheaper Fuel
- Independence of Weather Conditions

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"TOXEMENT"
"CEMENT FILLER" and "CEMENT FLOOR PAINT"

TOCH BROTHERS
ESTABLISHED 1848

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For application to the inner surface of exterior brick or masonry walls, above grade level. Prevents the penetration of dampness. Saves the cost of furring and lathing.

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For backing limestone, granite and other building stones. Absolutely prevents any interior acid, alkali, rust or moisture from reaching the surface of the stone.

"TOXEMENT."

A chemical compound which, when mixed to the extent of 2 per cent. of the amount of Portland Cement used, will render cement or concrete construction absolutely waterproof against pressure. Is used for water-proofing floors, foundations, elevator and boiler pits, cement mortar troweled on the outside of rubble foundations, cement stucco, etc.

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Used on structural steel work which is to be encased in masonry, and on brine and condenser pipes. This material will not withstand exposure to the elements.

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For use on cement floors in hospitals, laboratories, engine rooms, factories, etc. Will prevent cement floors from dusting up, also renders them oil-proof and water-proof.

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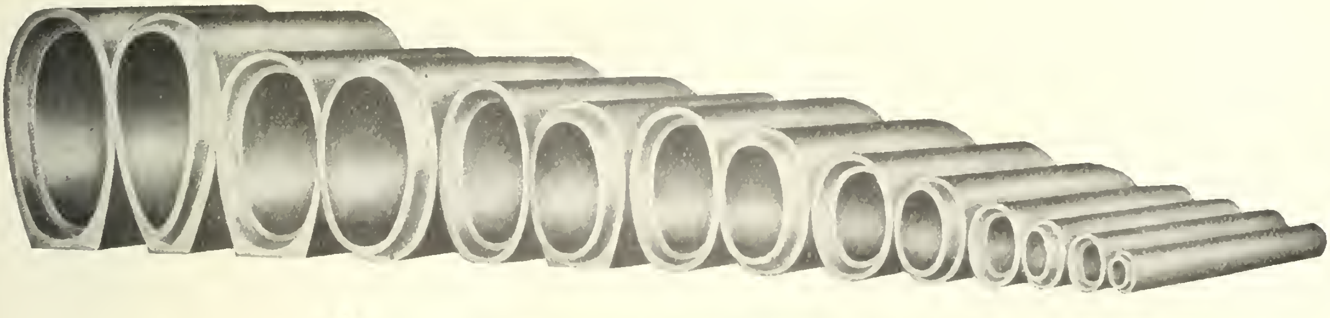

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properly built of properly made

- Reinforced Concrete Pipe -

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NO RUST, NO ROT, NO FROST-BREAKS, NO PRESSURE-BREAKS, NO HIGH PRICES, NO DELAYS IN PROCURING, NO TROUBLE IN HANDLING.

STANDARD REINFORCEMENT, or SPECIAL if required. Stock sizes 6 in. to 60 in.

Patronize Experienced and Reputable Manufacturers.

Catalogue and prices on application.

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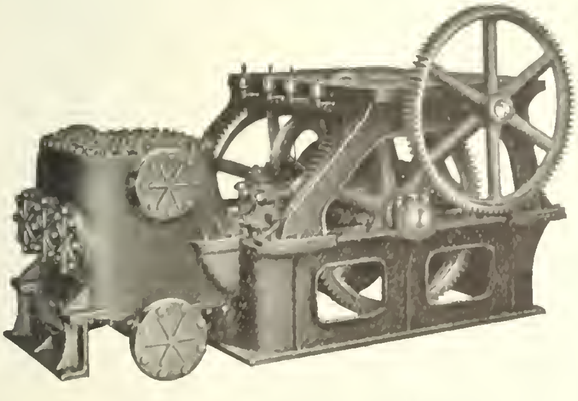

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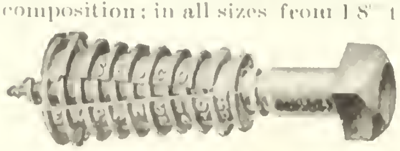

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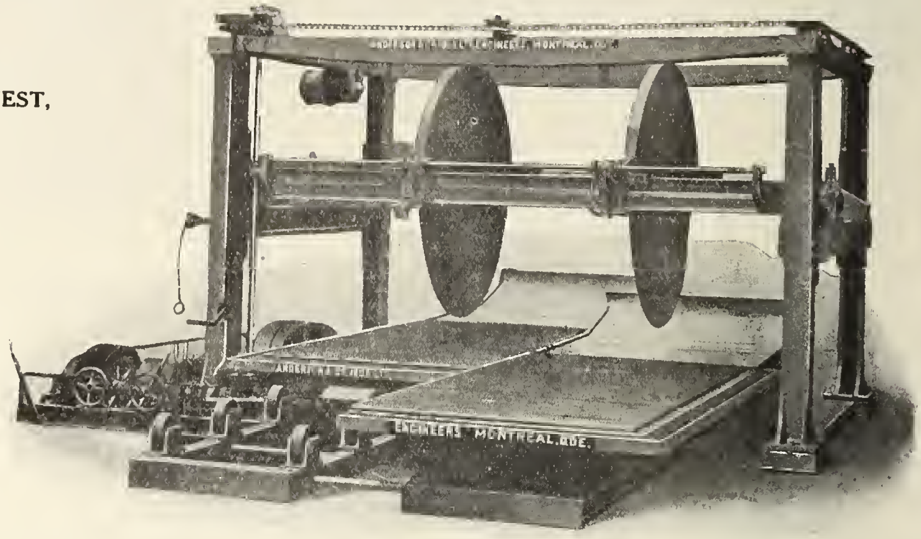

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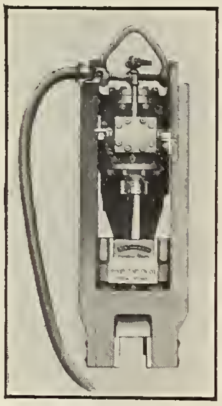

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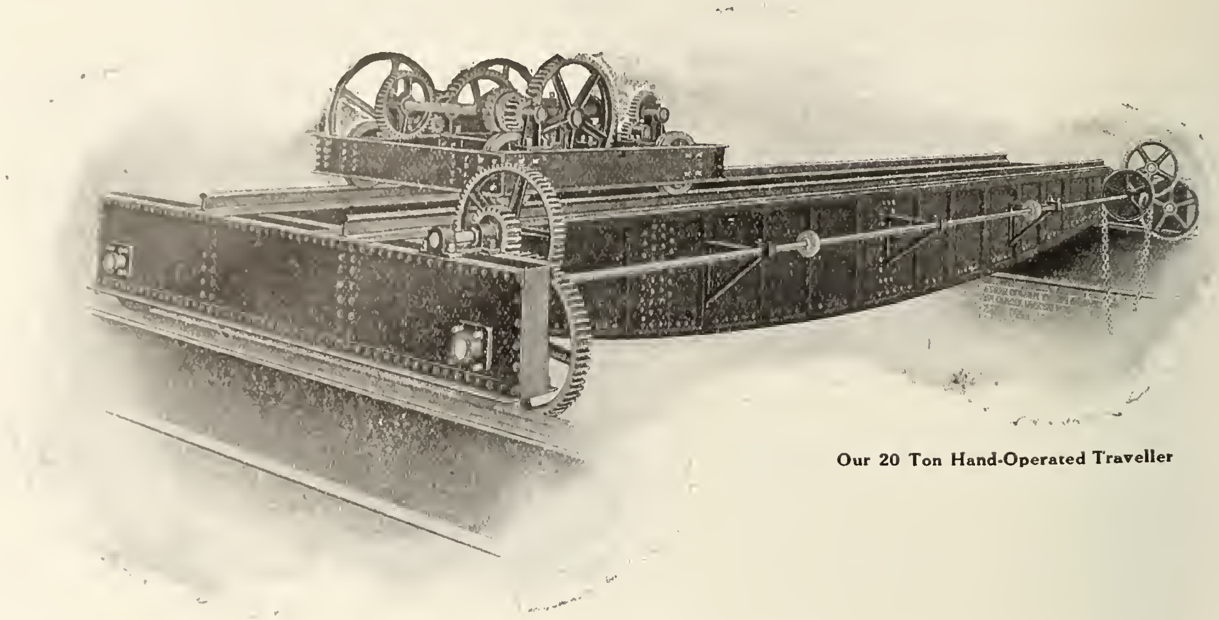

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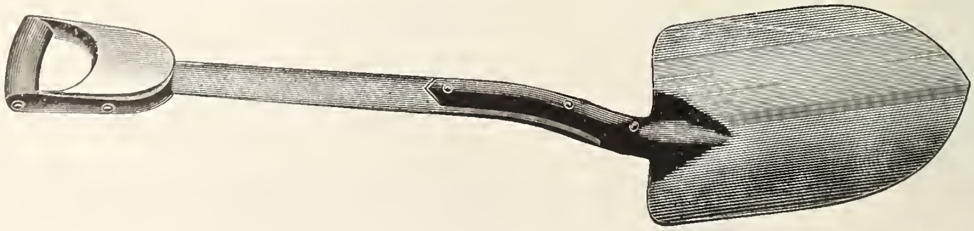

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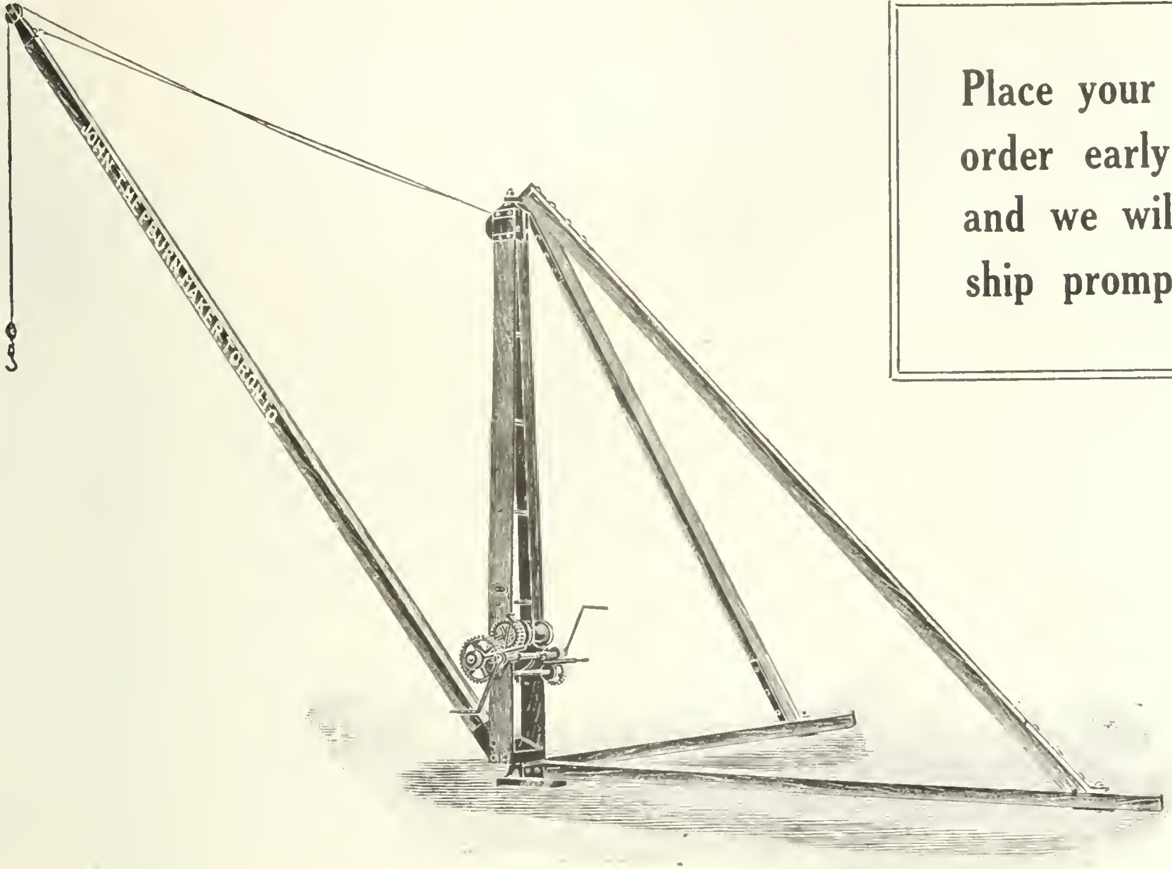
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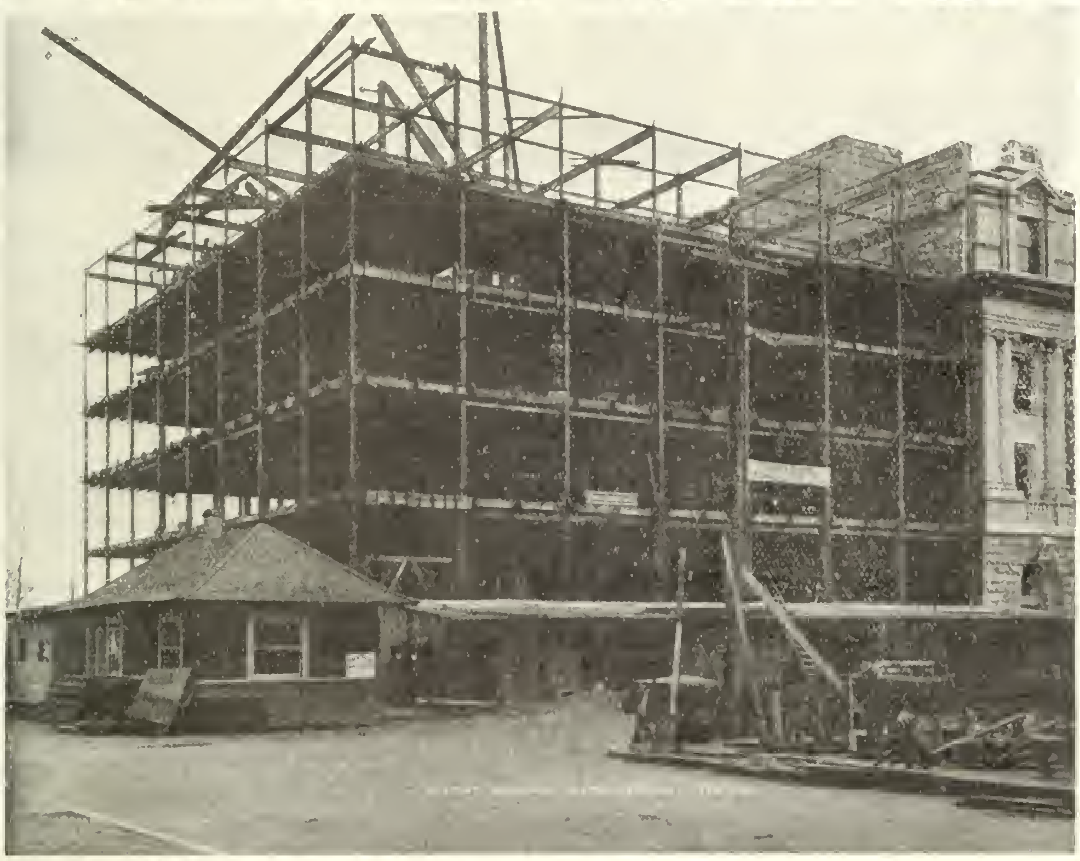

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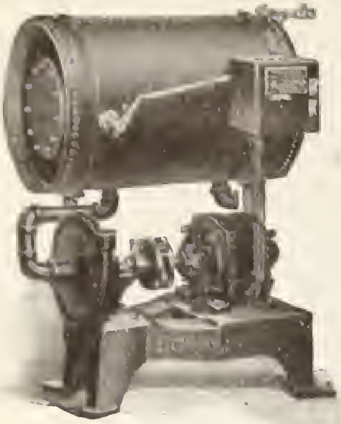

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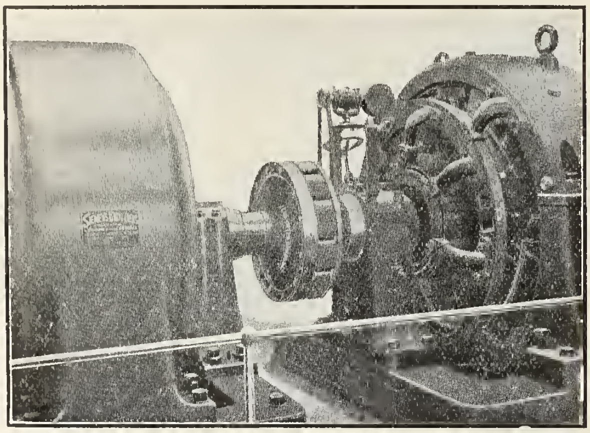

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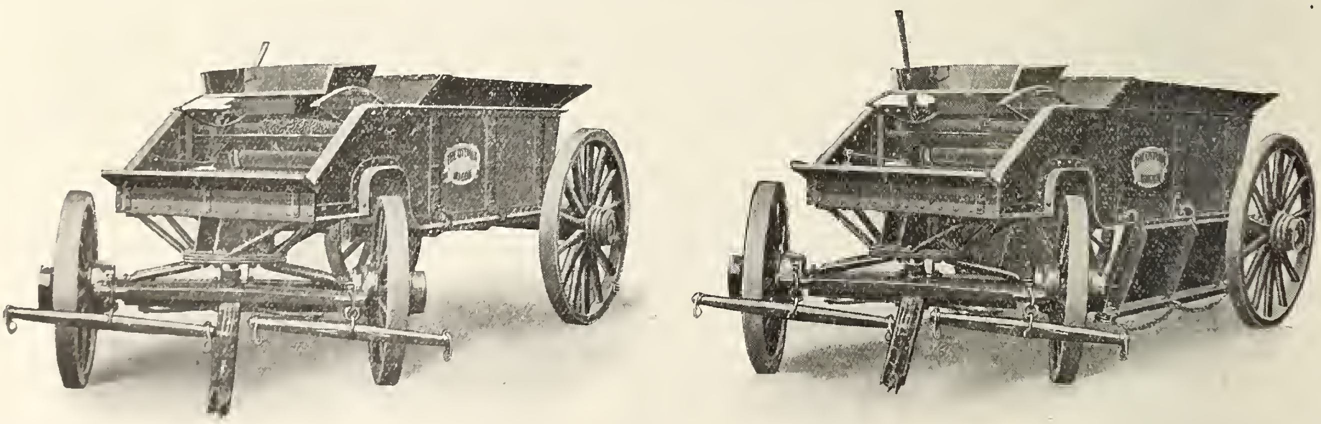

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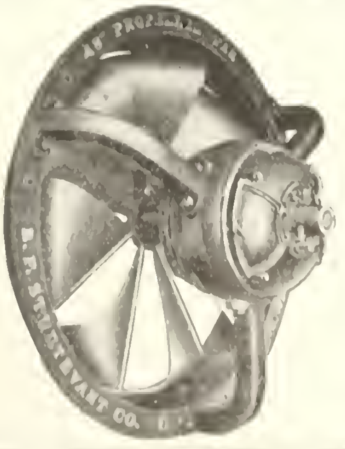

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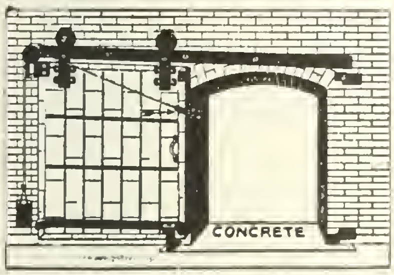

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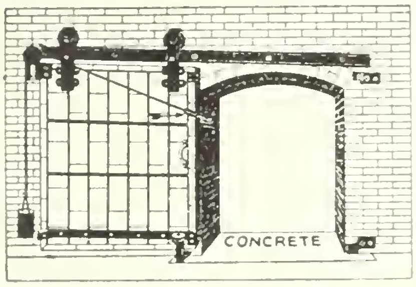

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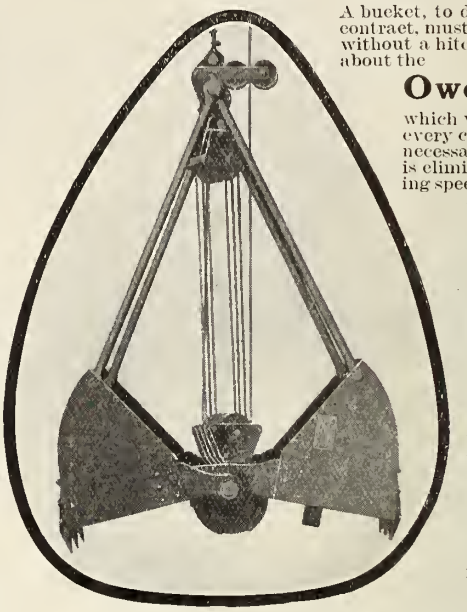

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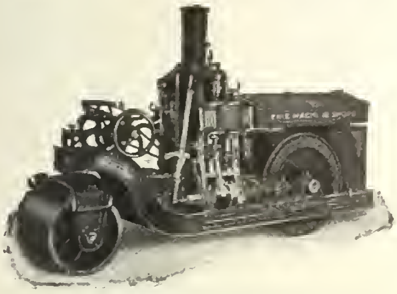

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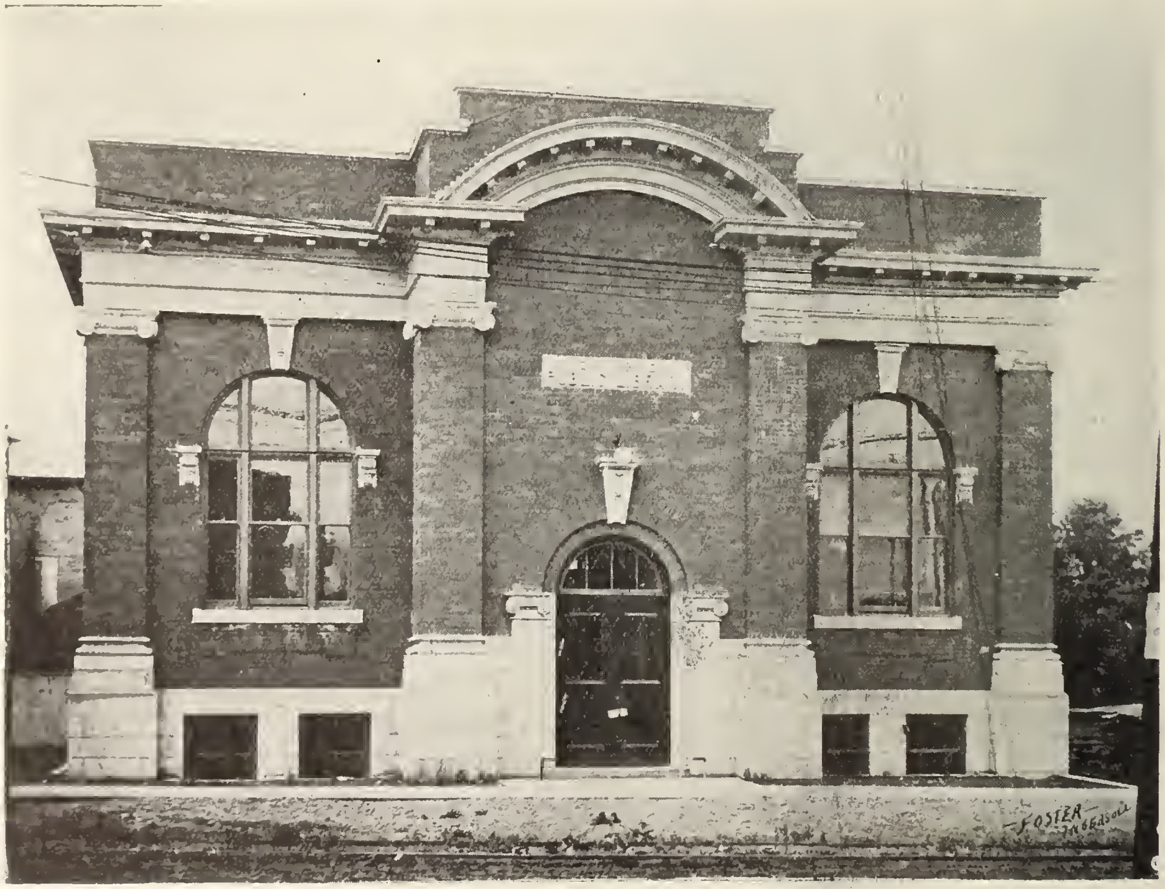

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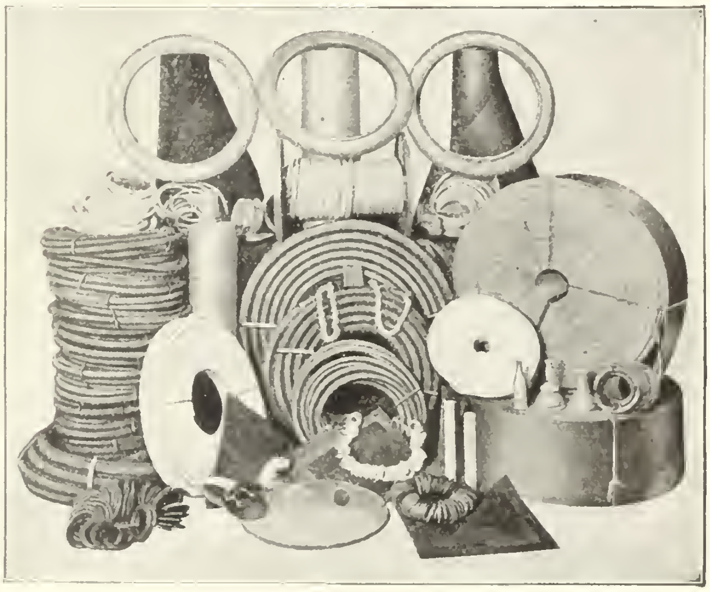

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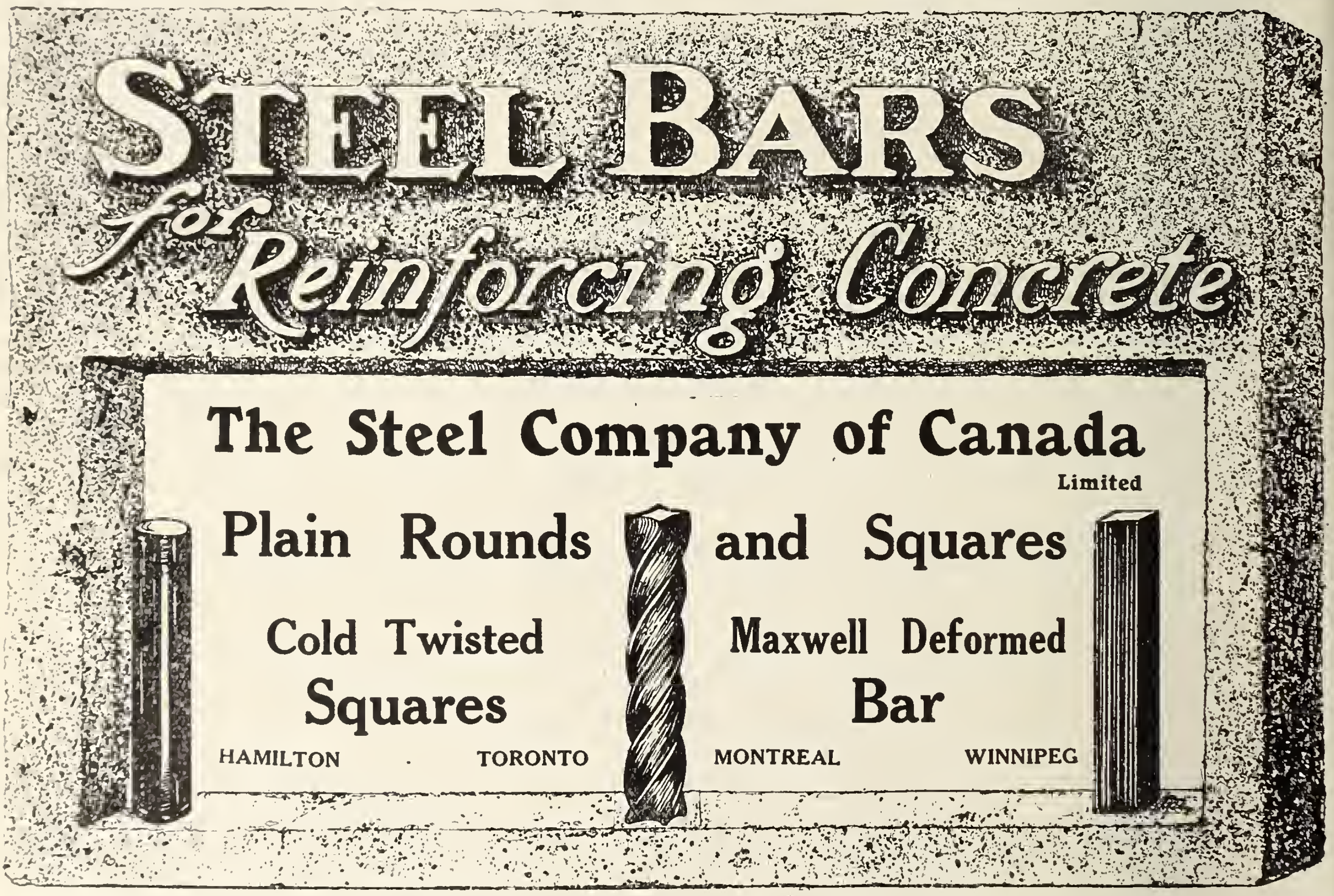

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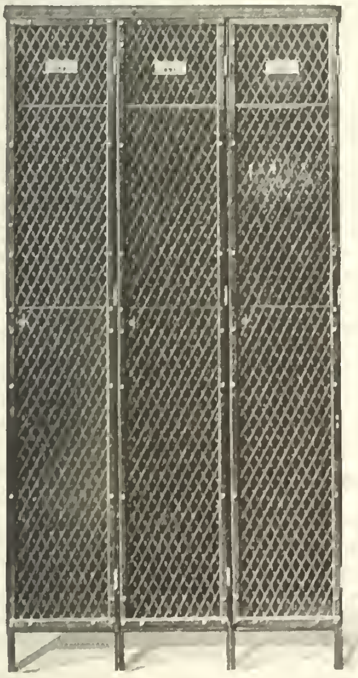

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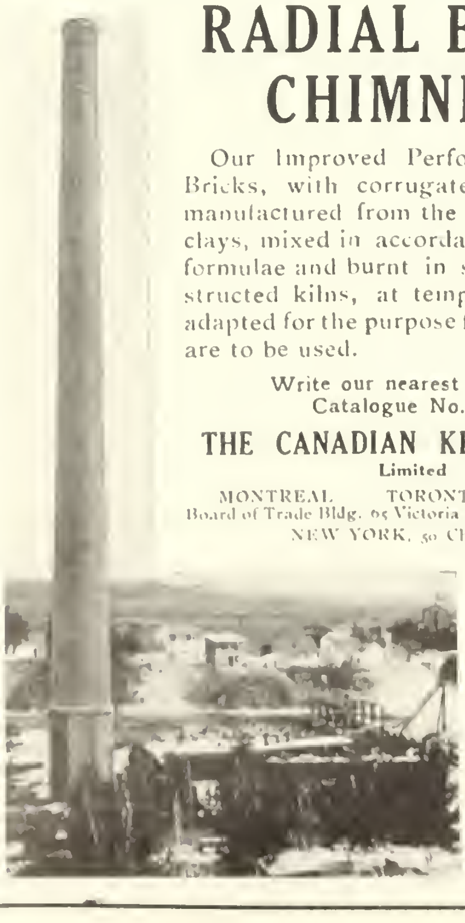

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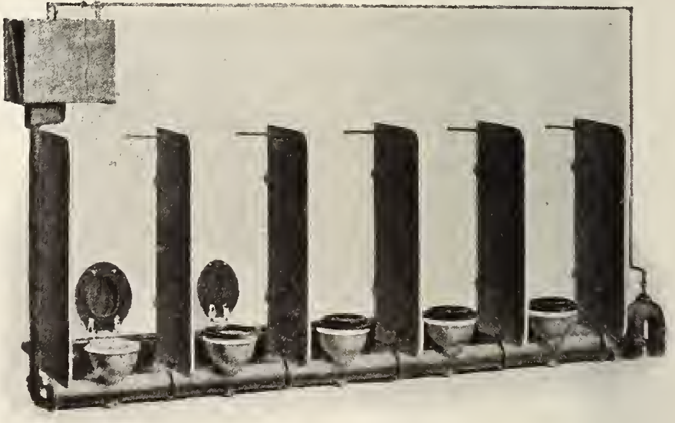

Plate F. 517

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Vol. 26 **October 9, 1912** **No. 41**

Concerning Competition

Integrity in Business—Effect of Cheapness

IN an English contemporary of recent date we read the statement that there is a growing tendency in Great Britain to "debase the national code of honor," and that in present-day business transactions "it is rarely that a man is troubled with conscientious scruples."

The same observations might be taken as a text for a profitable reading on business life in Canada. Too often dishonorable business is transacted under the all-covering cloak of competition. Competition within reason is right and proper, commendable and invigorating, but when it passes the limits of reason, when it is associated with unfair advantages and sharp practices, it ceases to become competition and comes perilously near fraud. A great many men enjoy a reputation for good salesmanship when they are entitled only to notoriety for their easy deception of honest men. We have all met the man who can look us straight in the face, eye to eye, unflinchingly, and lie to us. Apart from the moral aspect of the case such conduct is to be condemned by reason of its unmitigated selfishness. In business or out of business the man who is concentred entirely in himself should live and deal only with himself.

While Canada is a prosperous country and the majority of us prosper, competition increases apace. With it the injunction to love one's neighbor as oneself is honored more in the breach than in the observance. The weak ones go to the wall without a passing thought from those who have shouldered them out of the contest.

It is suggested that the "deplorable condition of affairs" in the old country is largely due to the national fetish for cheapness and that it is attributable in the first place to the fact that the question that arises uppermost in the mind of the Britisher now is, what it will cost and not what quality is to be expected for the outlay. The comment is made, and it applies in a measure to Canadian conditions also, that in consequence of the universal demand for cheapness "competition in prices is always on the downgrade towards the bed rock of cost of production beyond which one may not go without disaster." The article concludes as follows:

"To such an exceedingly fine margin have profits been reduced that there is only the smallest scope left to produce or sell things more cheaply. Very different is it with competition in quality. There the field for improvement is almost illimitable, and there is always a world of room left in which to make or sell wares of a better quality. This form of competition appeals to the taste and intelligence of the buyer and not to their mercenary instincts. It is primarily based on the goods and their merits. There is a general indisposition on the part of the producer to trust public taste, and when one remembers the all-absorbing rage for cheapness, this is not very surprising. But those who make quality their first consideration seldom go wrong in the long run, and fasten their clientele with the strongest bonds. Giving satisfaction, they retain the patronage of their customers and tempt others into the fold. Success achieved in this way is the more likely to be lasting than a consistent pandering to the craze for cheapness which means inferiority of wares and dissatisfaction. To earn the good opinions of one's customers, as one can only do by supplying a really good article at a fair price, is to ensure their permanent patronage."

APROPOS of contract reform, a new method of inviting tenders for stores has been adopted by the London County Council, and it is to be given a year's trial. Hitherto the practice of the Council has been to allow any firm to tender in reply to an advertisement. Under the new system, in place of a separate advertisement (usually in two or three papers) for each form of tender, a comprehensive advertisement will be issued twice a year in a large number of trade and daily papers inviting applications to tender for the various classes of goods supplied. On receipt of such applications the usual enquiries will be made at once, and not, as at present, while the tenders are actually awaiting acceptance. All firms who apply and are found to be satisfactory will receive forms of tender, which is quite different from the system of inviting tenders from a limited number of selected firms. The tenders when received will be opened as provided by standing order, and will be dealt with exactly in all respects as in the past. The system will, it is hoped, assist very materially in securing that contracts will be in the hands of only fair and satisfactory firms. Should it prove successful it will doubtless be largely adopted by other local bodies.

Readers of the London, Eng., Building News received a shock not long ago when they saw a full page cover advertisement published entirely in Japanese characters. There was considerable speculation as to the meaning of the strange hieroglyphics, but the situation was relieved the following week when the enterprising advertiser followed the announcement with a full-page translation in English.

Ottawa's "Leaning Tower"

AMERICAN emulation of Old World examples in the field of architecture is plentiful, but the city of Ottawa may certainly lay claim to originality in copying such an unique feature as the "leaning tower" of Pisa. The only difference between the "leaning tower" of Pisa and that of the Victoria Memorial Museum at Ottawa is that the former exemplifies the possibilities of skilful design, while the latter . . . doesn't. It is not charitable however to observe such differences, and Ottawa is entitled to be classed with Pisa and all other cities having building curiosities.

Reference to this leaning tendency of the main entrance tower of the Victoria Memorial Museum was made in our issue of August 28. Since then we have had the pleasure of another visit to the Capital and have managed to obtain the evidence arrayed in the accompanying illustrations.

It is generally understood that the settling and cracking of the walls is attributable to the soil upon which the building has been erected. The human element is contributed by the Department of Public Works, who were duly informed of the underlying strata of blue clay. There is every reason to believe that the unequal settlement of the building is due to the improper proportioning of the tower footings, the concentrated heavy load requiring a greater spread than was allowed.

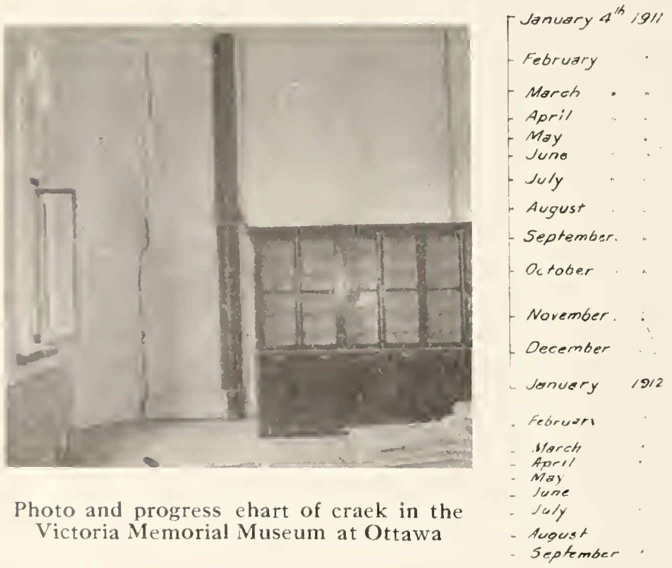

Photo and progress chart of crack in the Victoria Memorial Museum at Ottawa

Whether anything can be done to remedy the "lean" of the tower is problematical. As fast as the tower goes out at the top the consequent opening is filled with brick and concrete so that the eye of such dignitaries as high Government officials may not be offended. Such procedure is open to criticism. The only thing in its favor is that it provides a fairly steady job for a plasterer and helper.

While repairing the crack a short time ago, the space between the faces of a fractured brick measured over four inches and at times one could see into the offices below, through the space between the wall and the edge of the flooring, where the main walls are being pulled by the tower. The mosaic floor in the rotunda has been repaired at different times and is now ready for further treatment. The wooden floor on the ground level has a beautiful curve. We have seen such a curve on the deck of a ship.

An actual photo is reproduced herewith, together with a sketch showing the monthly movement from January 1, 1911, to September 1, 1912. According to a careful record the total movement to date is 2.7 inches.

Patchwork on such an important Government building, which cost the country millions, is discreditable, and it is to be hoped that an expert report will be obtained by the present government.

Newfoundland Slate

NEWFOUNDLAND slate has been advertised very freely of late in the London papers. Claim has been made that the product is equal to the best Welsh slate, and capitalists have been urged to make their investments "before the rush begins." In this connection an interesting editorial comment is made by our English contemporary, the Slate Trade Gazette, which says:

"Easily the best argument adduced in favor of investment is that new towns and cities are rapidly springing up in Canada and that slate is, in consequence, likely to be in great demand. It is said that the deposits face a deep sea harbor in one of the most easily worked and accessible spots in the world. These advantages certainly appear very alluring, but there is the other side of the medal to be considered.

"That there is a vast amount of room for slate in Canada cannot be gainsaid, but unfortunately for the industry, slate roofing is not in great favor "across the pond." Its turn may and probably will come, but that consideration is of no use to any one looking for speedy and regular dividends. The accessibility, too, is a good point, but we are not told anything about transportation to the western reaches of Canada where the towns and cities referred to are springing up. The railway charges are likely to be so heavy that the slate cannot compete with shingles and composition roofings.

"Newfoundland slates may be the very best in the world, but unless they can be conveyed to their destination at low rates, the producers can never hope to command either a ready or an extensive sale. Then the climatic conditions are by no means favorable to quarrying operations and shipping for a relatively large proportion of the year, and this factor cannot fail to seriously affect the cost of production.

"The picture has been painted in vivid colors, and if British capital is not attracted it will not be for the lack of cuteness on the part of the advertisers. Slate, however, has had such an unhappy experience of late in this country that those who are in touch with the building trade are almost sure to fight shy of speculating where it is concerned. In England, at any rate, the supply is greatly in excess of the demand."

The Woolwich tunnel under the River Thames, which is to be used by pedestrians exclusively, will be opened to the public in October. The tube is 11 feet 9 inches in diameter, 1,500 feet long and passes under the river at the point where the free ferry crosses. Steps lead down from the surface to the tunnel proper and elevators also have been installed. The maintenance of the tunnel and lifts, it is estimated, will cost about $12,500 a year, which is said to be considerably less than the operating costs of the ferry which the tunnel will replace.

The Engineer and the Community

By Professor Barr

TREDGOLD'S oft-quoted definition of engineering as "the art of directing the great sources of power in Nature for the use and convenience of man" may well be taken, and often has been taken, said Prof. Barr, as a text upon which to hang a discourse on the importance of the profession to which many of us belong, the leading part it has played in the process of civilization, and the dependence of the world to-day on its activities. But the words suggest failures as well as achievements, and responsibilities no less than privileges. The definition suggests that the engineer not only fails in his vocation if he does not accomplish something for the use and convenience of man, but, further, that he acts contrary to the spirit of his profession if he directs the sources of power in Nature to the unuse or inconvenience of man; and surely we must understand by "man" not the engineer's immediate client, but mankind in general. The works of the engineer are to be used by some people; they have to be endured by all.

Taking the highest view of our calling—and surely we do not hold that ours is in any sense a sordid or selfist vocation—the engineer fails in the fulfilment of his duty in so far as his works are detrimental to the health or destructive to the property of the community, or in so far as they are unnecessarily offensive to any of the senses of those who are compelled to live with them. There has been too great a neglect of such considerations. The medical practitioner is held to be negligent of his duty if he acts solely in the immediate interests of his patient, and does not take due precaution to guard against the spread of disease or the offense of the community by the exhibition of unsightly forms. We should take as high a view of our responsibilities.

Practicability and Economy

In his presidential address to the association last year Sir Wm. Ramsay said that the question for the engineer has come to be not "Can it be done?" but "Will it pay to do it?" The answer to this question in respect to any particular proposal depends on the width of view we take in answering two preliminary questions: Whose interests are we to consider? and what do we mean by paying? Of course, there are limits that must be set in answering each of these; my present contention is that these limits are usually much too narrowly drawn. A road surveyor may save a few pence or shillings to his county council by leaving a piece of newly metalled road unrolled because the clock strikes the hour for retiring and may thereby cause expense amounting to pounds, it may be to hundreds of pounds, through damage to motor cars or the laming of horses—not to speak of loss of life or limb—to the users of the road, who are, after all, the clientele he is there to serve. Does it pay? The authorities of a city will spend large sums on the adornment of the streets with stately and ornate buildings and on the purchase of works of art—and rightly so, though comparatively few of the citizens can appreciate or even give themselves the chance of appreciating them, while they will tolerate, or even be directly responsible for, the running on these same streets of quite unnecessary ugly and noisy tramcars, and congratulate themselves on the drawing of a paltry income from the display of hideous advertisements that are constantly before the eyes of the whole community. Does it pay thus to separate aesthetic from utilitarian demands and interests?

It is too much to assume that engineers could meet all the reasonable demands of their immediate clients without producing, at least temporarily, secondary effects that may be of inconvenience to some members of the community.

When we examine into the immediate causes of the injuries and inconveniences that result from our activities we find that they are due to successes. The more completely the engineer achieves the primary end of his work the less is the damage or injury that can be laid to his charge. If it can be shown that this is a very general law, as I think it can be, we may look forward to the elimination, as a direct result of progress in the mechanical arts, of the nuisances and inconveniences for which, in some measure at least, we must accept responsibility. And not only so, but the converse will be equally true—the more we keep in view the removal or avoidance of anything than can cause offence, the more rapidly we shall advance in the attainment of the primary ends at which we aim. Consider, by way of example, the nuisance of which we hear so much—the raising of dust by motor cars. I shall not discuss the debated question as to how far the motor car produces dust, or only distributes it, nor shall I deal in detail with the possible remedies. We hope to have a paper on the subject at this meeting from one of our leading authorities. For my present purpose it suffices to point out that it is no part of the function of a road surface to fritter itself down into dust under traffic of any kind. The ideal road would be one that would not wear at all, and the nearer we approach this ideal of a permanent road surface the less will be the inconvenience caused, not only to those responsible for the upkeep of the road, but to the general public. And, conversely, the more attention we give to the devising of a dustless road the more rapid will be our advance towards the provision of one best suited for all the purposes which a road is intended to serve. We had dusty roads before the motor car came into being, but the demand that is being forced upon the engineer to eliminate this nuisance is leading to an improvement of our roads for all users. The inventors of the automobile will yet merit the thanks even of those who, bemoaning the

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[*] In his recent Presidential Address to the Engineering Section of the British Association.

blatant intrusion of science into our lives, may discard the railway train and the motor car and take to the stage-coach of their grandfathers with a view to the recovery of some of the lost repose.

Again, the combustion of fuel does little harm to anyone: it is the imperfection of the combustion that is the main cause, almost the sole cause, of injury to health, to property, and to the amenity of populous centres. Of course, one knows that smokeless combustion is not necessarily, nor always, the most economical, but that is only because we have not yet learned how to use fuel in anything like a perfect manner. But all the tendencies at the present time are towards improvement, and the more attention we pay to the elimination of the smoke nuisance the more rapid will be our progress in the economical use of one of the most valuable of our inheritances. It is therefore clearly the duty of every engineer who has to do with power or heat production—for the credit of his profession and even in the interests of his immediate clients—to consider the use and convenience of all who can be affected by the work for which he is responsible. The time is not far distant when the direct burning of bituminous coal in open grates will be looked upon as not only a source of serious harm, but as a culpably wasteful practice. Great progress has been made in processes for the partial distillation of coal by which a free burning and quite smokeless fuel is prepared and valuable by-products (so-called) are conserved. If all engineers concerned with the design and application of plants in which coal is used had a due sense of their responsibilities to the community, progress would have been, and would to-day be much more rapid; and economies would be effected that would, in themselves, amply justify the application of more scientific methods of utilizing the constituents of a very complex material, which we are too apt to look upon as merely a convenient source of heat—plentiful enough and cheap enough, as yet, to be used in a most wasteful manner. It will not be to the credit of our profession if it should require restrictive legislation not only to prevent a gross interference with the health and comfort of the community and the amenities of our centres of industry or of population, but to effect economies in the utilization of the chief of the sources of power which it is our function to direct to the best advantage of all concerned.

After expressing the opinion that in the near future the power and heat required for domestic purposes will be distributed in a perfectly inoffensive manner from large central stations, and pointing out that the appeal to selfish interests, which would be one means of attaining this end, is not inconsistent with Nature's method of securing progress, Prof. Barr proceeded:—

"It is just a hundred years since passengers were first carried on the Clyde in a mechanically propelled ship, and to-day—when they are not too completely obscured by smoke—we can see the successors of the 'Comet' plying on that river with power plants of greatly superior overall efficiency, but showing little advance in regard to the combustion of the fuel. Had the emission of smoke from the river craft been prohibited years ago, there is little doubt that engineers would have let few days pass without arriving at some solution of the problem of inoffensive power production, and the demand for economy would have looked after itself. How much better it would be were engineers to take the wider view of their duties and responsibilities to which I have referred, and realize that they are acting contrary to the true spirit of their profession when they produce appliances that pollute the atmosphere for miles around to the hurt and inconvenience of those whose 'use' they are intended to serve! But this year a ship has left the Clyde that we hope may be the forerunner of a new race which will attain a higher efficiency than any of the direct descendants of the 'Comet,' and that will ply their trade without inconvenience to man or beast, who can claim some right to be permitted to enjoy an unpolluted atmosphere and the measure of sunshine which Nature—sparingly enough in those regions—intended to provide."

After dealing with the subjects of offences against good taste and the sense of the beautiful, especially as exemplified by the lavish embellishment of some early steam engines, Prof. Barr said:—

Appropriateness in Design

"There are, and must always be, wide differences of opinion regarding what is good or bad in matters of taste, but we may go so far in generalization as to say that we can admire the association of elements we know to be incongruous only in compositions that are intended to be humorous. . . .

"There are lengths to which even artists will not go in the arrangement of elements in a composition. But an artist will secure a color scheme at which he aims by the introduction into his landscape of a rainbow in an impossible position, or of an impossible form or dimensions, or with colors arranged according to his own fancy, though in this there is a much more essential unreasonableness. A polar bear might be transported to the desert and an Arab might conceivably find his way to the regions of snow and ice, but a rainbow cannot wander from the place assigned to it by Nature, nor can it have other than the ordained form or dimensions or sequence of colors. No artist would paint a figure holding a candle and make the light fall on the side of the face remote from the source; but he will, and usually does, paint the moon illuminated on the side remote from the sun. Why? Simply because he has not before his mind the essential absurdity of the scheme, if indeed he knows why the moon shines. Artists who deal with Nature in any of its aspects may be commended to 'mark, learn, and inwardly digest' Whistler's definition of their calling: 'Nature contains the elements in color and form of all pictures . . . but the artist is born to pick and choose, and group with science these elements that the result may be beautiful.' Whether or not we are to understand that Whistler intended to include an accurate knowledge of physical facts and phenomena in what he calls science, he cannot have meant anything less than sense.

"The only valid excuse for such departures from the fit and rational in painting or in structural design as those I have instanced is ignorance on the part of the designer of the nature of the elements he employs, or a lack of skill to devise a possible or reasonable arrangement of details that will secure the general effect he desires. . .

"Our works—like the highest creations in Nature—should be beautiful and not beautified. . . The practice of resorting to extraneous adornments to minimize crudities of structural scheme had its rise—if I mistake not—in the comparatively recent times when culture and taste were at their lowest. It is specially characteristic not only of earlier times, but of the earlier stages of the design of any particular product. It has already disappeared in some cases, and will continue to disappear from the practice of the arts of construction as skill and taste develop. . . .

"I have already alluded to the abandonment of ornament in the design of machines, and I think there can be no one with any sense of the fit and pleasing who does not approve this change in practice. The stage coach and horses of former times were lavishly decorated—the carriage of to-day is more graceful and pleasing in virtue of the simple elegance of its lines. In the best domestic architecture of to-day we see the same tendency to trust for effect more and more to an artistic grouping of the lines and masses of essential parts and the gradual abandonment of purely decorative features without and within. There was a time when the hulls and riggings and sails of ships were lavishly ornamented; now even the figure-head—the last remnant of barbaric taste—has disappeared; and do we not find in a full-rigged ship of to-day—or yesterday, perhaps, one should say—a grace and dignity that no extraneous embellishments would enhance? From the racing yacht the designer has been forced, by the demand for efficiency, to cast off every weight and the adornments that so beset the craft of earlier times, with the results that there is left only a beautifully modelled hull, plain masts, and broad sweeps of canvas, and we can hardly imagine any more graceful or beautiful product of the constructive arts. These examples will serve to illustrate the contention that the attainment of the highest efficiency brings with it the greatest artistic merit. . . .

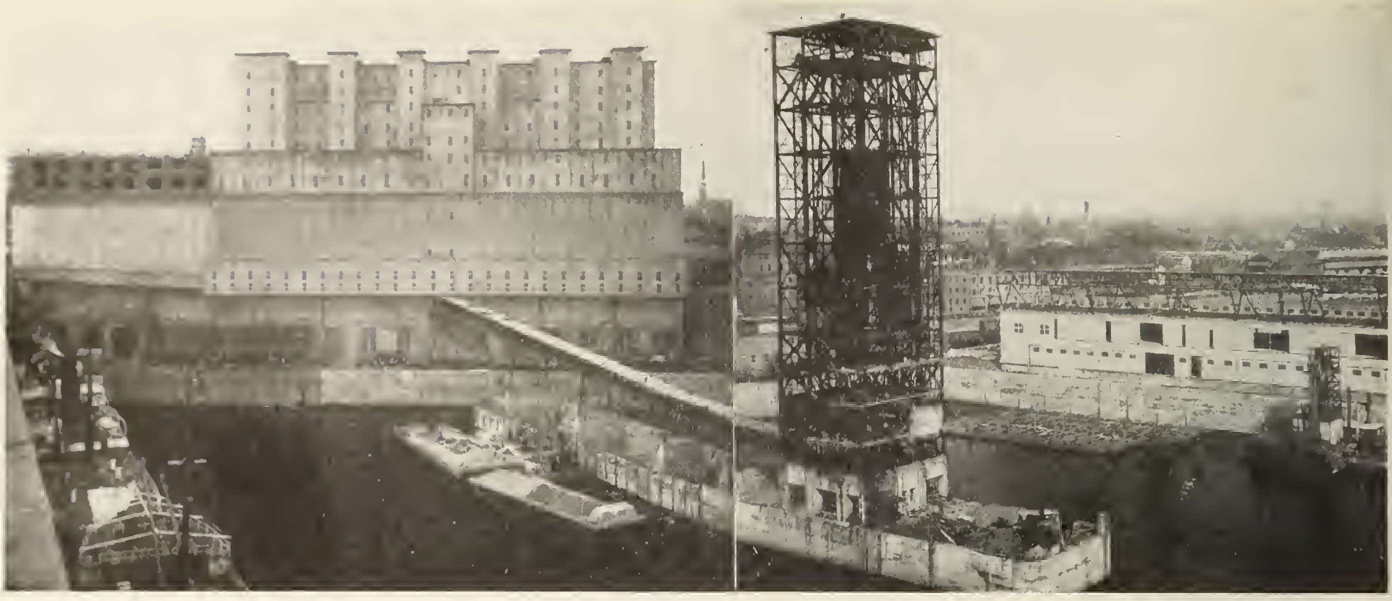
"It is a matter of constant remark, and with justice, that steel bridges, as a class, are much less pleasing to the eye than those of stone. The building of stone bridges is an ancient art, and survival of the fittest and selection—even with little creative skill on the part of the designers—would have led to the development of types having, of necessity, at least the elegance of fitness. But, further, this art has come down through the times to which I have referred, when artistic and utilitarian aims had not yet been divorced in the practice of the crafts; and, further still, the practice of building in stone has been in the hands of architects, as well as of engineers, and architects are expected to be artists, and are trained as such. On the other hand, construction in steel is a very modern art, and it has been in the hands of engineers who usually neglect, if they do not despise, the study of the fine arts. But why have architects, with their artistic training, not succeeded in producing artistic structures in steel as admirably as those they design in stone? Partly, no doubt, because they are hampered by tradition. They have not yet fully realized the difference in spirit that must characterize fit designs in the newer and the older materials. No one can be an artist in any material the possibilities and limitations of which he has not fully mastered. Again, if a common engineer may venture the criticism, the architect, as a rule, has not sufficiently mastered the science of construction, and has been too much addicted to taking the easy course of adopting a decorated treatment instead of striving to secure elegance of structural scheme as such; and decoration, at least on anything like traditional lines, is wholly incompatible with the best possibilities of steel as a structural material. Progress is being made in the art of designing efficient and graceful structures in metal, but the best results can only be attained by a designer who has a thorough scientific and technical knowledge of the properties of steel and the process of its manipulation, on the one hand, and cultured artistic sense and capacity on the other. These should not be considered as appropriate equipments for separate professions."

One of the Largest Reinforced Concrete Elevators in the World opened at Montreal

THE Hon. J. D. Hazen, Minister of Marine and Fisheries, on October 2nd formally opened in Montreal harbor one of the largest reinforced concrete elevators in the world. This is known as No. 2, and was designed by the John S. Metcalf Co., Ltd., who also superintended the construction for the Montreal Harbor Commissioners. It has a capacity of 2,622,000 bushels, and brings the handling and storage capacity of the harbor in excess of any other North American ocean port. The elevator is connected by conveyors with the No. 1 elevator, and can deliver grain to 15 steamship berths in the central harbors. The Government have approved of an immediate addition to the No. 1 elevator, by which its capacity will be increased to 2,500,000 bushels.

In the construction of the elevator just opened 48,000 cubic yards of concrete and 5100 tons of steel were used. The machinery will be run by electricity, and for this purpose 64 motors are installed, the horse power totalling 4000. The elevator is 157 feet long, 100 feet wide, and 220 feet high. In the foreground of the cut will be noticed in course of construction the two immense marine legs, which will receive grain from the steamers which will berth alongside. The grain is conveyed across the gallery connecting the legs to the elevator, and then by means of a system of endless rubber belts conveyed to the various bins.

Two distinct telephone systems are used, one for the elevator and one for the conveyor galleries. Each is of the intercommunicating metallic return type with centralized talking and ringing energy. There are 13 telephones in the elevator. In the conveyor system there is a telephone station in each shipping gallery and tower. The tower station consists of a standard telephone giving communication with the other towers and with the elevators. Each gallery station consists of a number of telephone jacks and extension bells wired in multiple. One jack is placed at each ship-loading spout, the number of jacks in the different galleries varying between 14 and 19. Each of the twelve receiving legs in the elevator has an independent signal system, consisting of a red and green light and two push buttons on the weighing floor in the cupola and a red and green light with one push button on the first floor. The two red and two green lights are connected in multiple, and so wired with the push buttons that when the red lights are turned off the green lights appear and vice versa. The man on the weighing floor can reverse the lights at will; but the man on the first floor can only turn off the green lights and turn on the red. This is done to



The new elevator in Montreal Harbour

guard against the first floor operator sending up grain before the weighing man is ready to receive it.

The five shipping legs in the elevator are equipped with similar sets of signals; but as each leg is served by a pair of 5,000 pound automatic scales, an addition to the signal is necessary to take care of the automatic weighing feature. This consists of a blue light and bell on the weighing and first floors wired in multiple. When a shipment of grain is to be made the scales are set for the proper number of drafts necessary to make up the required amount. When the scales reach the tenth draft before the final, the blue lights show and the bells ring. When the final draft is made the scales automatically turn out the blue lights, turn on the red and stop weighing. The object of the blue light and bell is to notify the operators to stand by to shut off grain when the last draft is weighed. In addition to the above special signals, a complete system of speaking tubes, car puller signals, etc., is provided.

In general, the conveyor signal system is designed to operate a bell and light in series in the elevator and each tower between any particular conveyor belt and the elevator, the signals being operated by push buttons connected in multiple and located at the shipping spouts served by that belt. The signal light is numbered to correspond with the belt from which the signal is sent.

The automatic scales, fourteen in number, were supplied by the Canadian-Fairbanks-Morse, Limited, Montreal, and are stated to be the largest automatic scales ever constructed. In order to build them it was necessary for the manufacturers to erect a complete elevator at Sherbrooke for the purpose of testing each machine before shipment.

At the luncheon, presided over by Mr. G. W. Stephens, the President of the Harbor Commissioners, Mr. Hazen spoke of the intention of the Government to spend money on the principal Canadian harbors so as to make them national undertakings. A great deal more money, he said, would have to be spent on the Montreal harbor, and when the Government recently authorized the expenditure of six million dollars on that harbor it was for the purpose of making it a national harbor. They were looking forward to the time when the elevator capacity, even with the addition sanctioned, would not be sufficient, and the elevator just opened had been designed to allow of an extension when needed. Mr. Hazen also spoke of the Hudson Bay Railway, which he believed would be of immense advantage not only as an outlet for the produce of the West, but as a means of relieving the admitted congested condition of the transportation facilities. It was, he believed, a thoroughly practical scheme, which would be of great benefit to the province of Quebec and the Maritime Provinces.

Results have been recently published of cold-water corrosion tests made in 1 in. pipes 30 ft. long, the temperature range being 50-70 deg. Fahr. The test lasted for nine days. Hot water tests at 125-135 deg. Fahr. were also made in pipes 5 ft. long with similar fittings, the tests lasting three days. Mechanically filtered water was found to be much more corrosive than the original supply; water from a slow sand filter usually slightly more corrosive; a pond supply, showing virtually the same alkalinity, very corrosive; as also was a driven well supply. Treatment with lime decreased slightly the corrosive action, while soda had little effect. Heat, both in iron and galvanized iron pipes, greatly increased corrosive action. Alkalinity with lime increased corrosion with cold, but had a reverse action with hot water. In every case galvanized iron pipes showed less action than iron pipes, defective coating or thread cutting no doubt being to blame. Dissolved oxygen greatly assisted corrosion, the oxygen in the water being greatly diminished after the test. The removal of small amounts of protective organic matter was held responsible for the increased corrosion of filtered waters.

Experiments made with a view to bringing aluminium to a liquid condition capable of being spread when cold over any dry surface, have, according to statements in the German press, been crowned with success. The composition is applied like paint with a brush, and gives an appearance similar to dull silver coating. It is said to be an excellent rust preventative, possessing resistance to heat up to 500 deg. Cent. It is also stated to be elastic, durable, proof against atmospheric influences, and a perfect substitute for tin in plating.

Highway Bridges and Culverts

[Extracts from Bulletin No. 43, a revision of Bulletin No. 39, United States Department of Agriculture, issued by the United States Office of Public Roads, by C. H. Hoyt, formerly superintendent in charge of bridge engineering, and W. H. Burr, consulting engineer, Office of Public Roads.]

COMPARATIVELY little attention has heretofore been given to the design of highway bridges, and the result has been disastrous in many instances.

The relation of culverts and bridges to the general movement for the improvement of our public highways is intimate. The desirability and economy of building these structures of durable and permanent material, or according to intelligent or economic design, has not thus far been actually recognized in practice.

Modern traffic now demands that the construction of bridges and culverts shall keep pace with industrial development. The administration of these matters in the United States is placed largely in the hands of local officials, who are scattered as individual units throughout the country. In many of these localities the amount of this class of work under the jurisdiction of one local official has apparently not been sufficient to warrant securing the services of a capable engineer in connection with this work.

The work of the Office of Public Roads, Department of Agriculture, is for the purposes of securing the improvement of all public highways throughout this country, and in connection therewith highway bridges and culverts should be given their full share of attention. In consequence, the office will send an engineer whenever practicable to confer with local officials, upon their request, concerning this class of work; to make inspections, recommend such types of construction as are adapted to given locations, and give such other information and assistance as may be practical in the individual case.

In addition to this it is intended to issue other bulletins giving designs, specifications and general information for small culverts and bridges.

The plan to be observed should consist of steps such as the following:—

(1) The services of a capable bridge engineer should be secured.

(2) The foundation should be tested to determine its suitability, bearing power, and economy.

(3) The location should be determined within a close approximation, and a profile of the centre line made, showing also the results obtained by testing the foundation.

(4) The loads which the bridge may be called upon to carry safely, anticipating reasonably the demands and growth of the future, should be decided upon. All highway bridges, at least those on main roads, should be designed to carry concentrated loads, such as road rollers or traction engines weighing from 10 to 15 tons each, with a reasonably factor of safety. Unfortunately for the traffic of to-day, many of the present highway bridges were designed to carry only moderate uniform loads, and this accounts for their light appearance and their inadequacy to meet present demands.

(5) After these facts have been determined the engineer will be able to prepare plans for the foundations, abutments, piers and the bridge itself, all of

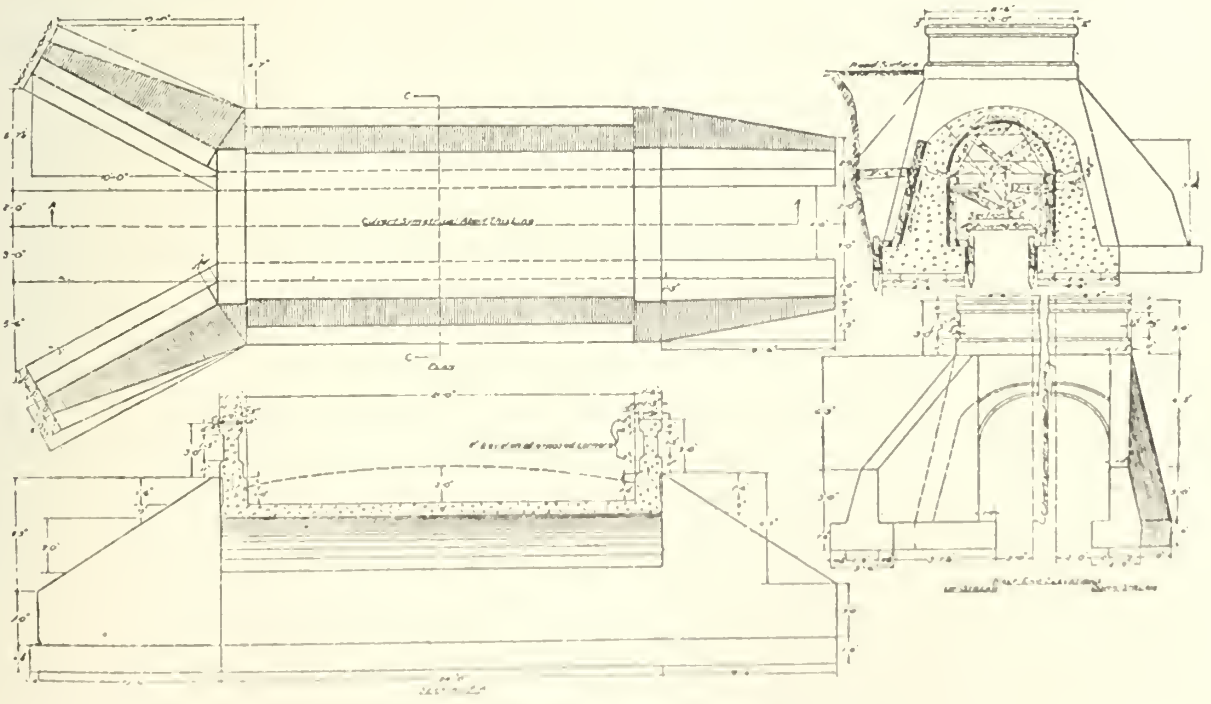


FIG. 1.—A PLAIN CONCRETE ARCH CULVERT, 6 FT. SPAN.

Quantities.

Concrete: Arch and parapets	1-2-4	12·0 cubic yards.	Required	Portland cement	10·2 barrels.
Side, end, and wing walls	1-2½-5	39·8 ,, ,,		Sand	33 cubic yards.
Footings	1-3-6	20·1 ,, ,,		Stone or gravel	66 ,, ,,

which may be designed to meet economically the conditions of the location selected. An estimate of the cost may be made, and this should in all cases be used as the basis for an appropriation for the bridge.

Foundations

The question is much involved, and it is difficult to treat it satisfactorily in the limited space which can be given it here. . . For many of the smaller box culverts of spans varying from 2 ft. to 8 ft., and carrying only ordinary loads, the ordinary earth foundation (bed) is sufficient in most cases, with proper protection against undermining by currents of water. Where the streams are sluggish, however, or where the culverts are located in swamps, and the foundations (underlying soil or strata) are soft and wet, a few logs from 10 to 12 in. in diameter, which are placed below in trenches, and upon which the footings rest, add much to the stability of the foundation . . . The suitability of foundation (soil or strata) for the more important structures can be safely determined only by tests. This can be done best by digging test pits wherever conditions will permit. . . Where conditions do not permit test pits, an iron rod may be driven to depths of from 10 to 20 ft., unless rock is encountered before that depth is reached. This method, however, gives very little idea of the material through which the rod is driven. A somewhat better way is to drive down 1-in. extra heavy iron pipe, which may be cut into 4-ft. lengths and coupled together as driven. A driving cap should be provided, and the driving should be done with wooden mauls. Pipe has been driven in this manner in the winter months to depths of about 30 ft., or possibly more. The pipe, after being driven, may be pulled out with a small chain and lever, so that a sample of the material through which the pipe was driven may be brought up inside it. This material can then be examined as the pipes are uncoupled and cleared out.

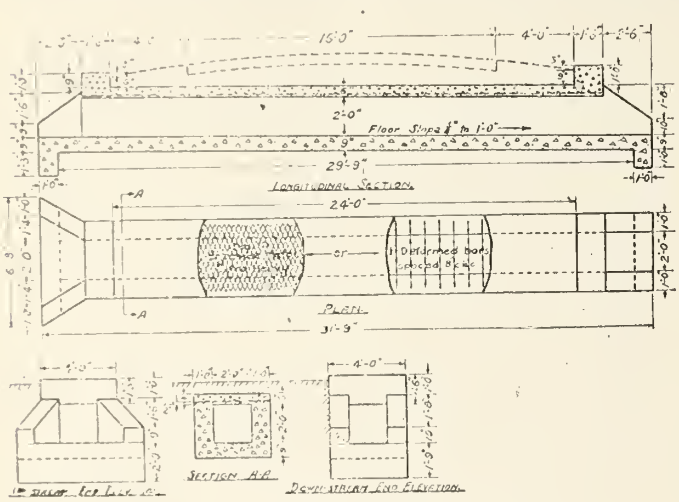


Fig. 2. A Concrete Box Culvert, 2 ft. Span.

Quantities.

Concrete :	Top and parapets	1—2 —4	2·4 cubic yards.
	Side and wing walls	1—2½—5	4·6 ,, ,,
	Footings	1—3 —6	4·0 ,, ,,
Materials required :	Portland cement		16 barrels.
	Sand		5 cubic yards.
	Stone		10 ,, ,,
	Expanded metal, No. 10, extra heavy		95 square feet.

Alternatively, 41 ½-in. def. bars, ¼ sq. in. nett area, 3 ft. 6 in. long = 122 lb.

Arch bridges or culverts especially require an unyielding foundation, and are more than likely to fail unless such is provided. Consequently, they should not be built except where a good rock or gravel foundation is to be had, or possibly where a satisfactory foundation can be made by driving piles. Attention should be called to the fact that piles may be driven in an inclined position, and thus be able to resist the arch action directly.

Masonry Arch Bridges and Culverts

The arch is a type of structure which should not be undertaken by inexperienced builders, or with haphazard methods. The services of a capable engineer should be secured, and, with proper materials, thorough construction, and favorable local conditions, the arch is an economical and desirable type of bridge construction. The illustration (Fig. 1) is made from a working plan prepared in the Office of Public Roads for a plain concrete arch culvert with a 6-ft. span, which may be of service more often than those of larger spans.

The reinforced concrete arch has an advantage over the plain concrete arch in the fact that the curve of the reinforced structure may be made more nearly flat than the plain concrete arch, and thereby save in the total height of the structure. This permits it to be used where it otherwise could not be. Under favorable conditions there may be an additional advantage in point of economy, although this cannot be stated generally as true in all cases.

The steel reinforcement in the arch serves the same purpose as in the concrete slab—that is, to increase the strength of the arch rib where the concrete has excessive tensile stresses. In some cases, however, the concrete is also reinforced against compression. It is also possible, when steel reinforcement is used, to reduce the quantity of concrete in the arch rib from the amount that would be required for a plain concrete arch.

Steel Trusses

There are still a few types of trusses used to which are given the names of their original inventors or proposers, such as the Pratt truss, the Howe truss, or the Warren truss, as well as some others.

Formerly the Howe truss with upper and lower chords and compression web members of timber, but with wrought-iron tension web members, was extensively built. It has now gone out of use, except in some remote districts where economy of first cost is absolutely essential. In these bridges cast-iron joint blocks were used at the joints where the web members intersected the chords.

The Pratt type of truss, more or less modified frequently in consequence of the varying depth of truss, is much used, and makes an excellent style of bridge. It is adapted to almost any length of span from 100 ft. up.

The Warren truss with riveted joints, formerly much known as "a lattice girder," is an excellent bridge for highway purposes for lengths of span from 60 or 70 up to 100 ft. or more in locations where the plate girder would be too expensive. In fact, except for locations where the operation of riveting in the field is too troublesome or expensive, this type of bridge has great excellence for almost any length of span up to as much as 200 ft.

I-Beam and Concrete Spans

One of the best types of culverts for spans from 10 to 30 ft. long is the steel I-beam incased in concrete, upon which rests a relatively thin concrete slab which forms the cover for the culvert. The slab is designed to carry the load for a span equal to the distance from centre to centre of the steel I-beams, while the beams are designed to carry the load over the clear span from one side wall or abutment to the other.

Among the best features of this type of construction are its safety and ability to withstand severe and unfavorable conditions, such as the unequal settlement of abutments, which may cause cracks in the concrete that would cause other types to fail. In this type, however, the load is carried principally by the steel I-beams, whose strength is not destroyed by the settlement of the abutments.

Many structures of this type have been built without incasing the I-beams in concrete, but by merely painting the beams instead, to protect them from rust. The painting, however, must be repeated every few years, at some considerable expense. There is, of course, a great possibility that this painting may never be done, and decidedly the better way is to incase the beams in concrete during the construction, and thus protect them permanently.

This type also admits of arch construction between the beams for the floor system. By this means space may be saved in the depth of the floor system that may be of value in locations where the area of the waterway or the "head-room" is a controlling factor.

Reinforced Concrete Slabs

The length of the spans over which reinforced concrete slabs may be built within the limits of practicability and safety depends much upon the loads to be carried. The depth and amount of fill over the culvert, which may distribute the effect of the concentrated load is also an important factor.

On main roads, where concentrated loads, such as road rollers or traction engines, are to be provided for, and the depth of fill over the culvert is sufficient only to provide a cushion of earth from 1 to 2 ft. in depth, the concrete slab is practical for spans up to about 10 or 12 ft., while for greater spans than this, under these conditions, other types better adapted to the longer spans should be used.

Under conditions of less severe loading the spans for the slab may be increased up to 16 or possibly 20 ft., but it does not seem advisable to use them for these greater spans in view of the possibilities of a nominal future growth of traffic requirements.

Box Culverts

The box culvert gets its name from its similarity to a box with open ends. It has a floor, which may be of plain concrete or may be paved with stone. The two sides and wing walls at the two ends may be of plain concrete or reinforced with steel, but the cover and parapets should always be of reinforced concrete.

The sketch shown (Fig. 2) is made from a working plan prepared in the Office of Public Roads for a concrete box culvert, which has an opening 2 ft. wide by 2 ft. high, and forms one of the set of standard plans.

This type of construction is practical under the majority of conditions for spans up to about 8 ft., which, as a matter of fact, forms a large percentage of all the culverts needed. Conditions may occur where it will be practicable to apply the box type, with some modifications, to greater spans than those mentioned, such as where the foundation is soft or liable to much erosion from swift currents. The floor may then be reinforced with steel, so that it will have greater strength to act as a beam to distribute the load over a greater area. It may also be extended back of the side walls to act as a footing. With suitable "cut-off" walls to prevent currents of water from running beneath this floor, the foundation will be well protected from erosion.

Reinforced Concrete Highway Bridges

TWO reinforced concrete bridges of a flat-slab type of design have recently been built on the State Highway between Denver and Morgan City, Col. The bridges carry the roadway across the east and west channels of Bijou Creek, Morgan County and adjacent lowlands, and are respectively 128 and 354 feet in length.

The two structures comprise a reinforced concrete slab supported on a series of concrete pile bents. The ground in this vicinity is composed of a fine sand which becomes quicksand at a slight depth below the surface and is underlaid at a considerable depth by a bed of firm clay. At the site of the bridge crossing the west creek this clay is found at a depth of from 40 to 45 ft. below the surface, while across the east channel of Bijou Creek and its vicinity it is to be found at a depth of 30 ft. The concrete piles were driven to a firm bearing in the clay.

The piles were all manufactured at a plant easily accessible from both of these bridges and the piles were hauled from the plant to the sites of the two structures. They varied in length up to somewhat over 60 ft. and were 14 in. square at the large end and 10 in. square at the smaller end. The edges were chamfered and the piles were reinforced with five ⅝-in. round rods, extending through their entire length. The pile bents were made up of four piles each, spaced 5 ft. 3 in. on centers, and were capped by heavy reinforced concrete girders 24 in. square. These bents were spaced 16 ft. on centers.

The pile sections were carried into the section of the caps to a depth of 6 in. and the pile reinforcement was bent over and anchored in the concrete section of these caps. The caps were reinforced with ¾-in. rods placed at the top and bottom of the concrete section and tied together with ⅜-in. straps placed at intervals of 24 in.

The floor system is made up of a series of reinforced concrete slabs 16 ft. long and 17 ft. wide, the last dimension being the entire width of the bridge. These slabs are 15 in. thick at the curb line and 16½ in. at the centre, thus providing an adequate crown for drainage, and at either side of the bridge there is a concrete curb 8 in. high by 6 in. wide, built as an integral part of the floor slab. In this curb are placed drain pipes 2½ in. in diameter at suitable intervals. The reinforcement consists of 1 in. rods spaced 6 in. on centers supplemented by ½-in. transverse rods with the same spacing.

The slabs are supported directly on the pile caps and a sliding joint is provided between the two surfaces by means of tar paper. There is also an expansion joint in the slabs above each bent and tar paper is likewise placed at these points.

A wearing surface and roadway, consisting of 6 in. of dirt and gravel, was placed above the concrete slabs on each of these two bridges. A two-rail hand rail made up of sections of 2 in. pipe and fittings is placed at either side of the roadway for the entire length of the structure. The concrete used was a 1:2½:5 mixture with a gravel aggregate.

Comparison of Bridge Types

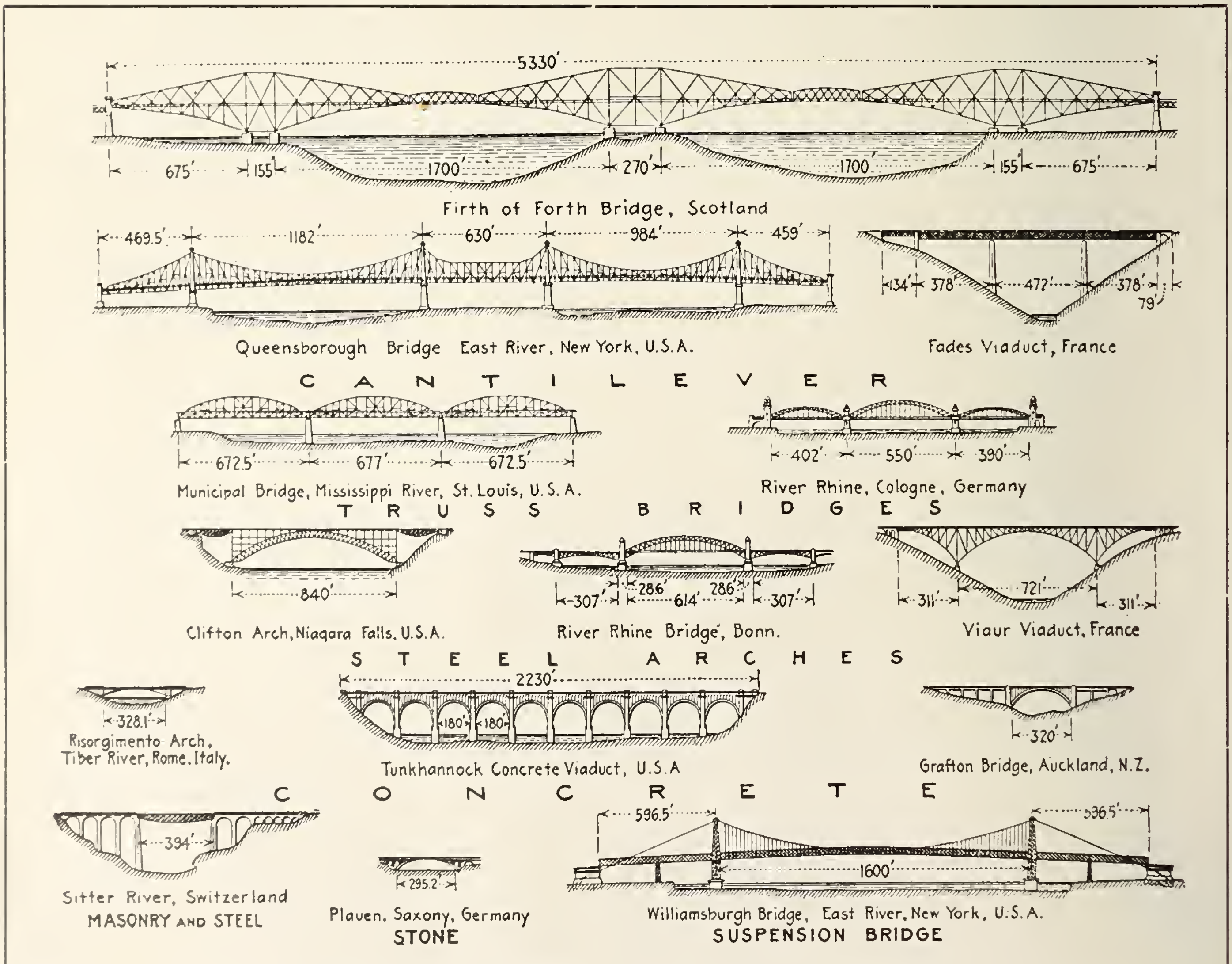
Features of Design in Some of the World's Most Noted Structures

THE outline elevations in the accompanying diagram afford an interesting comparative study of bridge types as embodied in a number of the world's largest bridges. In each of the various styles (truss, cantilever, etc.), the largest examples have been selected, all the elevations being drawn to the same scale. Thus, the Firth of Forth Bridge, in Scotland, has the largest cantilever; the Municipal Bridge at St. Louis, Mo., the largest single plain truss; the Clifton Bridge at Niagara Falls, the largest steel arch; the Risorgimento arch in Italy, the longest concrete arch; the Plauen Bridge in Saxony, the longest stone masonry arch; and the Williamsburg Bridge at New York City, is the largest suspension bridge.

The new Quebec bridge, now under construction, like the old bridge which collapsed in 1907, contains a cantilever span opening (1,800 ft.) 100 ft. greater than those of the Firth of Forth cantilever, but the bridge has only one cantilever span and is some 2,000 feet shorter in total length than the Scotch bridge. The Hell Gate Bridge, now under construction across the East River at New York City, is designed to contain a 1,000-ft. steel arch, which will be the largest of that type in the world; but the design of the arch has not reached a stage when its outlines can be given out. It should also be noted that the trusses of the Municipal Bridge at St. Louis are 668 feet between end pins, and that the dimensions given in the drawing are between center lines of the piers. The Fades viaduct in France, though built as a cantilever, is in reality a continuous truss.

The limitations in size of the masonry arch are particularly well shown by the drawing. The two longest span concrete arches (Risorgimento and Grafton) and the longest-span stone arch (Plauen) are mere pigmies compared with the structures of steel. On the other hand, the new Tunkhannock Creek viaduct, which the Delaware, Lackawanna & Western Railroad has now under construction, compares favorably in length and height with the largest bridge structures of the world.

Though there is small possibility of its ever being built, it may be well to note that the proposed Henry Hudson concrete arch across Spuyten Duyvil gorge at the north end of Manhattan Island is designed for a 703-ft. clear central span. To appreciate that size, compare the 721-ft. Viaur viaduct in France, with the bridge shown just below it, the 320-ft. Grafton arch in New Zealand, which is only 8 feet shorter and much larger in bulk than the longest span masonry bridge in the world.


5330'
675'
155
1700'
270'
1700'
155
675'
Firth of Forth Bridge, Scotland
469.5'
1182'
630'
984'
459'
Queensborough Bridge East River, New York, U.S.A.
134'
378'
472'
378'
79'
Fades Viaduct, France
CANTILEVER
672.5'
677'
672.5'
Municipal Bridge, Mississippi River, St. Louis, U.S.A.
402'
550'
390'
River Rhine, Cologne, Germany
TRUSS BRIDGES
840'
Clifton Arch, Niagara Falls, U.S.A.
307'
286'
614'
286'
307'
River Rhine Bridge, Bonn.
311'
721'
311'
Viaur Viaduct, France
STEEL ARCHES
328.1'
Risorgimento Arch, Tiber River, Rome, Italy.
2230'
180'
180'
Tunkhannock Concrete Viaduct, U.S.A
320'
Grafton Bridge, Auckland, N.Z.
CONCRETE
394'
Sitter River, Switzerland
MASONRY AND STEEL
295.2'
Plauen, Saxony, Germany
STONE
596.5'
1600'
596.5'
Williamsburgh Bridge, East River, New York, U.S.A.
SUSPENSION BRIDGE

Structural types embodied in some of the world's large bridges

The Largest Testing Machine in the World

A testing machine with a capacity of 10,000,000 lb., the largest in the world, has been designed by Mr. Tinius Olsen, of Philadelphia, for the structural materials testing laboratory of the U. S. Geological Survey, now a part of the laboratory of the Bureau of Standards at Pittsburgh, Pa. It was placed in operation on Sept. 12 in the presence of the members of the International Association for Testing Materials and broke a 4-ft. square brick column, 12 ft. high, under a load of 6,580,000 lb. The machine was designed to test a 60-ft. column vertically; the distance between the tension screws is 6 ft., which will admit of testing exceedingly large columns as well as slabs, and by placing an extension table on the lower platen the largest beams may be broken.

Machine Proper.—The machine proper consists of two large heads, each weighing approximately 30 tons, together with the four straining screws, each 13½ in. in diameter. On the lower head is mounted the cylinder, ram and lower platen. The lower platen has a spherical seat on the ram, so it may be adjusted or leveled.

In the design of the cylinder and ram, one of the most vital points was to secure a type of packing which would hold the enormous pressure and in which the friction could be governed and controlled. To cover this point, a new form of packing was invented, and before using in the large machine, it was tried in various small machines up to 1,200,000 lb. capacity and was found, in every case, to meet the requirements. This packing makes the friction against the movable ram a factor, which will vary directly with the pressure, and thus a constant that is readily eliminated in the standardization of the scale beam. The packing construction is such that no operator can alter it, and it is either effective, or if used up, absolutely useless, thus eliminating any personal judgment as to tightening.

The Upper Head.—The upper head is held on the long tension screws by four gear nuts, which are simultaneously operated through gearing and a large motor placed on the head, which raises it up and down to accommodate any length of column to be tested.

Pumping System.—The pressure is applied to the ram through the medium of a three-plunger variable stroke pump, operated by a 15-h.p. three to one variable speed motor. As the pump stroke can be varied while in motion from ½ to 3 in. any possible speed can easily be obtained. The three plunger pump forces the oil past a small air reservoir and hence into the cylinder, so that a practically uniform application of the testing load is maintained.

Weighing System.—It was not feasible to weigh the pressure on the main cylinder, so the pressure was transferred to a smaller cylinder, placed on the reservoir, and the pressure on this cylinder was weighed through the action of a lever system acting on a diaphragm placed in the smaller cylinder. The lever system terminates in a standard Olsen dial vernier screw beam and a light pointer beam. The screw beam reads directly to 2,000,000 lb. by 100-lb. marks on the dial, and with end weights to 10,000,000 lb., controlled by the hand wheel and indicator to the extreme right of the weighing system.

The beam is also arranged so that the poise weight will travel automatically at various rates, controlled by both motor speed variation and a set of variable speed cones, so that, with a set rate of application of the load on the beam, the application of the pressure in the cylinder may be arranged to balance the pointer lever and keep it floating.

Calibration.—To calibrate the machine, the weighing system was standardized completely up to 10,000,000 lb. by the use of standard levers and weights, so that the poise was absolutely correct for the portion of the load transmitted to it from the main cylinder. A specimen can then be placed in the machine, noting the compression within the elastic limit and accuracy determined, or it may readily be compared with any other smaller lever machine, by the use of two specially designed diaphragms, through which the pressure can be transmitted. Such tests will check up closely with the calibration of the lever system, and any deviation can readily be corrected in the weight of the poise on the beam.

Guide System.—The guiding of the upper head is of itself an enormous proposition, especially if the machine is ever lengthened to cover the entire height. Side thrust must be taken care of in the design of the building or tower and the staying of the machine to the tower. A guide frame connects the screws at the extreme top and is guided directly to the building, and at each corner of the movable head are shoes arranged so they may be stayed to the building at any set point allowing for slight extension of the screws while under load.

The equipment of the Australian Portland Cement Company's new works at Fyansford, Victoria, where the electrical plant has been specially designed for working in a dusty atmosphere, is of interest. Three-phase current is employed at a pressure of 500 volts, which is controlled by a Tirrill regulator. All the cables are asbestos covered and are laid in ducts. The motors embody some special and new features for making them dust-proof. They consist for the most part of standard three-phase slip-ring motors, completely enclosed by steel plates, but arranged with a powerful ventilating fan on the rotor. When the motors are working cool clean air is drawn through the whole of the windings and ejected again outside the building. The motors are provided with special built-on starters and a continuous movement of the hand wheel closes the stator circuit, cuts out the rotor resistance, and finally short-circuits the rotor.

Barges of reinforced concrete on the Panama Canal have been adopted because they cost less than steel and little more than timber. The ordinary flat-bottomed type with a rake at each end is used, and the overall dimensions are 64 ft. by 24 ft. by 5 ft. 6 7/16 in. maximum depth. There are two longitudinal bulkheads, and lateral frames, 10 ft. apart strengthen the construction. Generally, the reinforcement is of ½ in mesh, No. 12 wire cloth, attached to ½ in. square corrugated bars spaced 9 in. longitudinally and 12 in. transversely. On this is plastered inside and out, in the case of the shell, cement mortar 1:2, with 25 per cent. of lime; the bulkheads, frames, and deck are concreted with 1:2:4 material, placed in forms round reinforcement connected to the shell. Cracks developed before launching the first barge, but these were repaired and no further cracks have appeared. Timber fenders are provided.

Track Reconstruction at Vancouver

IN our issue of July 24, 1912, under the heading, "An Expeditious Piece of Work at Vancouver," we gave particulars with photographs, of track reconstruction carried out recently, over a part of Granville street, by the B. C. Electric Railway Company, who obtained permission to abandon traffic, during construction provided that it should be restored in 22 working days. The methods by which the work was carried out were described in our former article, in which it was pointed out that the time in which the work was accomplished established a new record in this field.

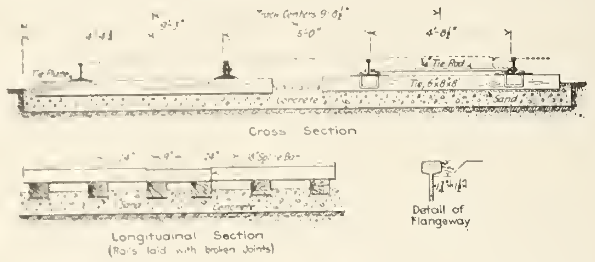


Fig. 1—Standard track construction of the B.C.E.R. Co.

The reconstruction of the tracks called for taking out and replacing the following quantities: 5100 sq. yd. of wood-block paving; 10,200 lin. ft. of rail or 5100 lin. ft. of single track; 1800 cu. yd. or 5100 sq. yd. of concrete; 600 cu. yd. of earth; and the laying of 2400 cu. yd. of concrete; half a mile of double track; 850 sq. yd. of granite flangeway blocks, and 4250 sq. yd. of wood blocks.

We now reproduce in Fig. 1 details of the standard track construction of the B. C. Electric Railway Company and also the progress chart that was followed in the reconstruction of the track. The chart was prepared in advance to ensure the completion of the work within a specified time. In reading the chart it will be noted that the horizontal spaces from June 10 to June 24 are 10-hour shifts.

Lateral Pressure of Liquid Concrete

Curves for Pressure Determination, Based on a Series of Experimental Tests

IN the designing of forms, centers, and supports for concrete construction—particularly of columns, walls, and other upright members—it is of great importance to be able to make accurate provision against distortion due to lateral pressure of the concrete while in a fluid state. In the Proceedings of the Institution of Civil Engineers, Mr. H. St. G. Robinson, contributes a diagram of curves for determination of such pressure, based on experimental tests extending over a period of years.

The first experiments were conducted about five years ago, during the construction of a heavy retaining wall, by placing boards between the uprights of the vertical forms, and noting the deflections caused by the various heads of concrete.

These experiments, however, were thought to be somewhat unreliable, owing to want of refinement, and Mr. Robinson has since carried out further experiments of a similar nature, but with an apparatus con-

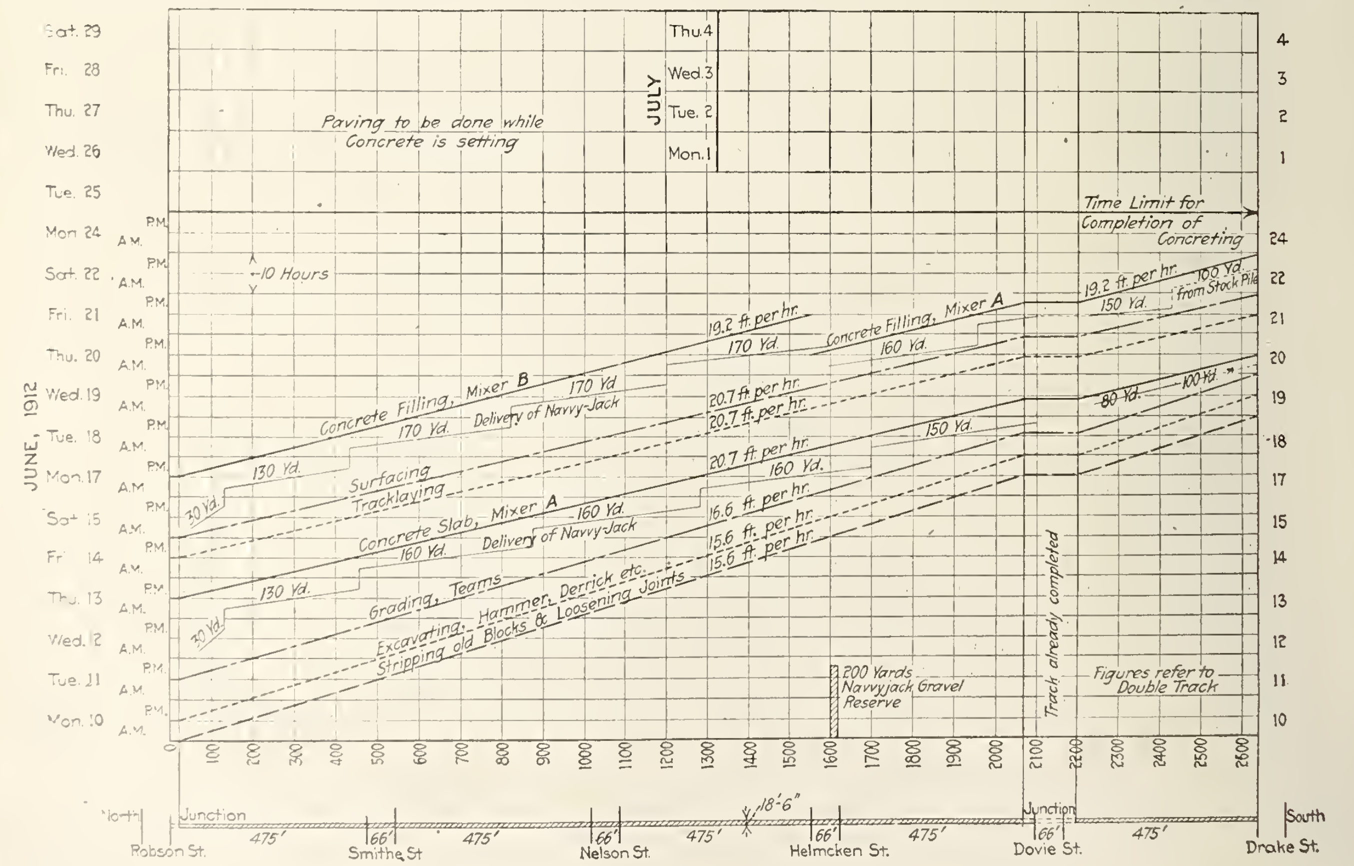


Fig. 2—Progress chart for track reconstruction; prepared in advance to ensure the completion of the work within a specified time

structed to secure more accurate results. This consists of a strong cast-iron chamber, fitted with a sheet-rubber working face, and is arranged so as to be readily fixed in position on the forms. The chamber is filled with water or other suitable fluid, and the pressure exerted by the concrete against the working face is recorded on two sensitive low-pressure Bourdon guages, conveniently suited behind the chamber.

A large number of experiments were made on different types of concrete structures. In heavy walls, large piers, and other members of fair size, the lateral pressure exerted was found to be fairly uniform and practically constant for equal heads; but in reinforced concrete columns of small dimensions, thin walls, and other light concrete work, the effect of friction between the more or less rough timber forms and the concrete, together with the arching action, was found to reduce the pressure considerably.

Two sets of experiments are recorded in the diagram, having been selected from a number made; they represent those in which the conditions were most favorable.

The first series of tests were made during the building of a long wall about 3 ft. thick, constructed of concrete weighing 140 lbs. per cubic foot and composed of slow-setting cement, sand, and crushed granite in the proportions of 1:3:6 by volume. In mixing, sufficient water was used to bring it to a thoroughly plastic condition, requiring little or no tamping to consolidate. The concrete was laid more rapidly than is usual in this class of work, being carried up as rapidly as the mixing and placing would permit, to a height of 8 ft. above the center of the pressure face, during which time, a light iron bar provided with a turned-up end was used for churning the semi-liquid mass. Four complete sets of readings were taken, and each point on the curve represents the average value at that head.

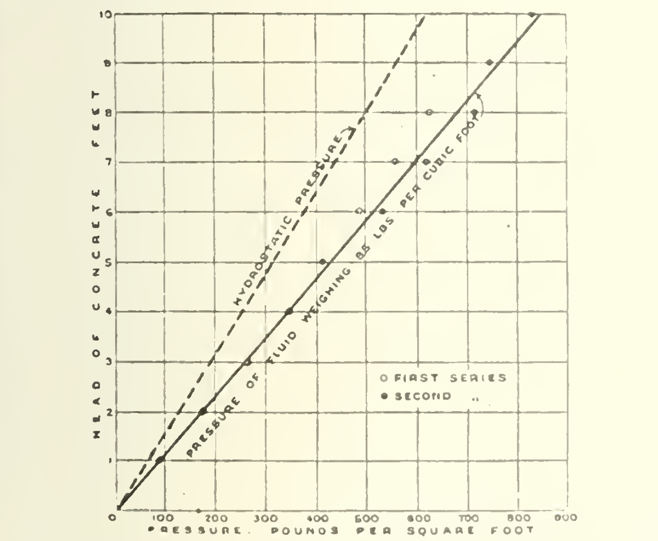


Diagram showing comparative pressure of water and liquid concrete

The second series was carried out on large piers 4 ft. square, the concrete in this case being a 1:2:4 mixture of cement, sand, and Thames ballast, weighing 145 lbs. per cubic foot. The conditions as to mixing and laying were similar to those of the first tests, and the concrete was carried up to a height of 10 ft. above the center of the pressure face. Each point of this second series represents the average of six readings.

In the first series the temperature was fairly uniform throughout; while in the second, considerable variation was experienced; but the effect of the differences in temperature on the lateral pressure cannot be traced, and would appear to be very small.

The general conclusion to be drawn from these and other experiments is that the lateral pressure of concrete for average conditions is equivalent to that of a fluid weighing 85 lbs. per cubic foot. For concrete in which little water is used in mixing, the pressures are rather less, having an equivalent fluid value as low as 70 lbs. per cubic foot in very dry mixtures.

Porous Concrete Walls with Waterproof Coating

AN interesting theory on the subject of porous walls, with exterior coating of impervious mortar, is made by a New Zealand writer who first states that dampness generally comes from moisture rising from foundations by capillary attraction, the walls being absorptive. He continues as follows:

> A common remedy to prevent moisture rising, is a damp-course laid just above the ground line, but it is evident that if the material of the walls will resist moisture either by being too dense or too porous to absorb it, the result will be much superior.
>
> Capillary attraction can only act between the two extremes of density and porosity, therefore to secure dry walls without the expediency of damp-courses and the like, we have only to make them either sufficiently porous or sufficiently dense. At the first "blush" it seems entirely wrong to make walls full of holes to keep out wet, but in seeking a desired result we may often find it by pursuing a contrary course to our preconceived ideas. I well remember being taught by a practical man to keep the edges of the boards of a boarded roof 3/16 of an inch apart in order to keep out rain. As a novice I would have placed them close together.
>
> I am at present building a ferro-concrete house with porous walls, no damp-course is at all necessary for the reasons mentioned, an impervious coating of roughcast on the outside keeps out rain-drift, and the result is that I shall have perfectly dry walls, the body of the concrete being too porous either to absorb or retain moisture.
>
> Another noteworthy point is, that a wall which is "absorptive" attracts damp from a humid atmosphere and holds it quite a long time, thereby causing a continual general dampness.
>
> Mortar in brick walls may be "absorptive," while the bricks may be quite dense.
>
> For the foregoing reasons I am of opinion that a porous non-absorptive ferro-concrete construction with an impervious skin of rough cast or other waterproof coating on the outside walls, is a thoroughly good system, substantial, and comparatively cheap, and is likely to become very popular now that wood is getting scarce and dear.

The cast iron pipe industry has made a substantial gain in the six year period from 1906 to 1911, according to statistics collected by the "Iron Age." The U. S. output, excepting the output of the U. S. Cast Iron Pipe & Foundry Company and James B. Clow & Son for which figures are not given, has been as follows: 313,300 net tons in 1906, 365,760 tons in 1907, 358,360 tons in 1908, 383,119 tons in 1911. The increase in manufacture was almost continuous from year to year until 1911.

Road Records for Engineers

The Value of Accumulated Data in the Field of Highway Engineering*

THE feature of road building practice which, probably more than any single item, makes it impossible to draw definite conclusions from the success or failure of any particular method of road construction, is the absence of correlated data respecting the work already done and its action under varying conditions. It is true that a great deal of recording of this kind of data and investigation of results is going on, but in very few instances, up to the present, are the data sufficiently complete or arranged in such a manner as to make possible exact determinations therefrom. That this is so can be seen very quickly from the analogies drawn fram results obtained in one country or another with the results desired and expected in a country possessing totally different climatic conditions. It is not very frequently that subgrades and arrangements for drainage are classified in road building records so that a clear estimate can be made as to the probable effect of the subsoil upon the roadbed itself.

KIND OF DATA NEEDED

For the most part those data have been confined to records of the material used for foundation and road surface and the amount of traffic involed. In order to determine what is necessary in compiling a record of the work on a piece of road which would be complete in each detail so as to form practically an exact reference, it is advisable to consider all the factors which enter into the case and affect the condition of the road and its wearing quality. These factors group themselves roughly into three classes:

1. Those concerned with the materials upon which and of which the road is built.
2. Those factors of strain upon the road surface from traffic conditions, etc., which affect the wearing quality.
3. Climatic and surrounding local conditions.

Under the first heading, the one concerning the actual material from which and of which the road is built, it would be necessary to consider the following items:

Subgrade, Character and Natural Drainage.—It would seem to be of considerable importance to know the actual condition of the subgrade, not merely in indefinite terms such as sandy loam, heavy clay, etc., but with sufficiently close particulars as to physical properties, particularly those as to the action of the soil in various stages of saturation, the extent to which it will absorb and hold water, or the speed with which water will drain through it. This should be coupled with an analysis of the soil so that data for future reference would be complete.

The foregoing would naturally lead to the conclusion that all methods taken to secure any necessary additional drainage would be to counteract the effect of a soil which would absorb and hold a great deal of moisture, in other words, all precautions taken to secure a firm subgrade.

The materials used for foundation, the size and character of stone, the character, grading, amount of fine matter and condition of gravel used, the regular tests of cement and the proportions of the mixture used, the method of laying this foundation, the weight used in rolling, the extent of rolling, thickness and all the usual records of this kind are desirable.

Surface Course.—Depth of surface course, character, grading of material used therein, analysis of binding material and method of application, the weight used in and extent of rolling and all other similar particulars should be recorded.

Traffic Strain.—In respect to the second group of facts entering into the records required in order to obtain total reference in regard to the road, that is, the character, extent and condition of the traffic strain, the important conditions are as follows: (a) The number of vehicles passing over the road in a given time and the maximum number passing over the road at the busiest time within a given short period, say one hour; (b) the proportion of horse-drawn vehicles classified as pleasure and commercial; (c) the proportion of self-propelled vehicles, similarly classified; (d) the maximum tonnage in each class and the average tonnage; (e) in the self-propelled vehicle class, the maximum speed and average speed would also affect the case.

Climatic Conditions.—With respect to the surrounding conditions, there are a number of factors which would affect the conduct of the road:

(a) The average rainfall, yearly and monthly, and the maximum rainfall in any one day; (b) the maximum and minimum temperatures; (c) the condition of the sides of the road, whether protected by banks or trees, whether entirely exposed to wind; (d) general conditions as regards wind speed and its continuity; (e) general surrounding conditions as to drainage.

The extent of data suggested in the foregoing remarks may seem at first glance to contain a number of factors which are not absolutely necessary for recording the actual conditions which may be needed for future reference in regard to the ability of the road to withstand traffic and climatic conditions. It will be seen, however, that no one set of data would be complete, or even illuminating, without being taken in conjunction with other data connected therewith.

VALUE OF DETAILED RECORDS

Take, for instance, the question of the necessary work undertaken in making a firm, well-drained subgrade foundation for the road. In a damp climate with a rainfall registered during some part of the day over a large percentage of the year, where the ground was in a more or less moist condition most of the time, the presence of a small amount of clay or loam in the subsoil might require expenditures and work upon the subgrade which would be entirely unnecessary, or greatly modified, in a soil containing the same percentage of clay, but situated in a climate where the rainfall covered only a few days in the year.

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*By Harry Tipper in the Engineering News.

In the same way it might be possible to use a building material in a climate where the maximum and minimum temperature were comparatively close together; this binding material would show entirely different results in a climate where extremes of heat and cold were experienced. Further, the action of a road surface in withstanding traffic might be an entirely different matter, even though constructed with the same materials, when the road is exposed to a practically continuous wind for nine months out of the year than where it is sheltered, or where there is very little exposure to steady wind.

Undoubtedly, a number of these factors affect the life of the road only to a comparatively small extent and might be neglected without greatly affecting the answer. They are suggested in this connection, however, because there has been very little attempt to consider them in relation to the other factors which are more or less known, and it would be necessary before definitely eliminating any of the factors mentioned to determine to what extent they affect the condition of the road so that their value could be properly estimated.

In the study of a great many articles written within the last year or so in respect to engineering practice in Great Britain, France and Germany, it will be observed that very few of these articles make any attempt at entering fully into the climatic conditions surrounding the roads in question, the conditions of the subsoil and the work undertaken to put this subsoil in shape.

The same lack of consideration for these factors is to be observed in most of the records published in regard to the roads in this country, although the variation in climatic conditions, condition of subsoil, exposure, etc., are so wide as to make it obviously impossible to translate bodify a success from one part of the country to the other without considerable modification.

DIVERSITY OF LOCAL CONDITIONS

In discussion of the road question in engineering societies, road societies, etc., it will be noticed that on very few matters are the members of the engineering profession agreed in regard to the theories and practice of road building. In fact, there is practically nothing, from the method of draining the subsoil to the depth of the foundation course, from the character of the binding material to the conditions under which surface treatment can be given, upon which opposing views cannot be found.

This feature of the opinions of engineers, seriously advanced from valuable experience, shows that local opinions with regard to any method of road building vary according to the conditions which the engineer has to meet in each locality, and these conditions are actual results of the factors suggested in the foregoing scheme for record. Instances have undoubtedly come to the notice of anyone who has studied the subject deeply, of successful practice which was apparently out of line with some of the commonly accepted principles, and these instances multiplied by other differences of results make it necessary for the investigation and record of the road building work to be sufficiently extended to take in all the surrounding conditions in order that the way in which they modify the general results may be properly estimated.

In many cases it has been stated by engineers whose work limits their necessities to one city or county that the conditions surrounding the building of a road outside of those affecting the material were sufficiently similar to make records of this kind unnecessary, and collection of the data would be sufficiently burdensome to make it desirable to eliminate them.

There is no doubt that this is to some extent true; at the same time it should be remembered that the progress in any branch of engineering work is directly due to the accumulation of experience thoroughly covering the practice and results obtained from such practice. The accumulation of all such experience gathered together from the practice covering thousands of cases results in the development of certain general methods and principles which finally concentrate the progress of the practice in that particular branch along certain well defined lines. As a consequence of this every engineer who desires to be sufficiently equipped to overcome the problems of the present and the future is dependent upon the general information which is available from the experience of all other engineers engaged in this class of work.

This information is valuable only so far as complete records of the condition under which the work was done, the materials used in accomplishing it and the results obtained are fully set forth. In highway engineering, up to the present, the information available has not been sufficient to answer thoroughly any of the problems which the engineer has to deal with, and it is, moreover, evidenced that a large part of this is due to the want of knowledge regarding the effect of the factors which do not directly enter into the building of the road, but undoubtedly influence the results to some degree.

THE TRAFFIC CENSUS

It is not many years since the engineer found it advisable to include in his records of roads built the traffic involved in each case, and even at the present time this very obvious feature is neglected in a very large number of cases.

It is palpably absurd to quote the success of a road where the traffic was confined to 200 vehicles a day in an endeavor to consider this method of practice for a street which had to accommodate over 5,000 vehicles a day.

The record, however, of the number of vehicles does not take care sufficiently of the conditions of traffic as to give an exact or even approximate estimate of the action of the road surface. This can readily be illustrated by considering the case of some of the macadam roads which successfully withstand for a number of years the traffic of horse-drawn vehicles which were unable to stand the automobile traffic even though the number of vehicles per day did not vary in any large proportion.

There are records of roads which have successfully withstood the combined horse-drawn and motor-driven traffic of comparatively light character, but have been broken by the passage of one traction engine.

In these cases the number of vehicles per day had no relation to the failure of the road, it was rather the character and the weight per wheel of some of the vehicles which had that effect. Where so obvious a factor as the traffic involved has not been fully recorded, it is evident that the records of road building practice are not complete.

The Road Board of Great Britain, which governs appropriations issued from the fund secured from the licenses of automobiles, taxing of gasoline and other appropriations, has just issued its annual report covering the fiscal year ending March, 1912. In this report some attention has been paid to the detailed statistics governing the traffic over roads, in order to illuminate the conditions which would affect the life of the road surface. These statistics give the four particulars as follows: 1. The average weight in tons per day. 2. Number of all vehicles. 3. Number of motor vehicles. 4. Percentage of motor vehicles.

If this report were further extended to give the maximum tonnage passing over the road in any one vehicle, it would be still further illuminating as illustrating the ability of the road surface to carry certain loads without breaking. The statistics, as they stand, are more complete than most published records of this kind and are a step in the right direction, provided they are taken in conjunction with the character of the subsoil, with the materials used and the climatic conditions.

A great deal of experimenting has been done on the road question and a great deal of excellent work has improved thousands of miles of road, but up to the present time our knowledge of the causes of success or failure are quite indefinite, and as a consequence our estimate of the value of any particular method or material is apt to be at fault where the local conditions vary from those under which the road in question was built. Careful accumulation of data is one of the principal necessities in improving this situation, and it must be accumulated in such a way as to take in not only the questions actually entering into the road building but those factors which affect it from a standpoint of traffic, climatic conditions and surrounding circumstances.

Mechanical Equipment of Michigan Road Commission

THE Board of County Road Commissioners of Wayne County, Mich., since its inception has followed the policy of using machinery and mechanical apparatus as much as practicable in place of manual labor and teams. The scarcity and uncertainty of labor and the high prices demanded by men in the vicinity of Detroit have made this policy particularly necessary. At the same time, says the Engineering Record, the speed and economy with which roads are built by the commission are believed to have fully justified the policy even from a purely financial point of view.

The commission constructs by force account all new roads built in the county outside the city of Detroit. It also maintains the improved roads and many structures on those that have not been improved. The topography of the country is practically flat. The soil varies from sand to sticky blue and yellow clay, most of the roads being through black soil and clay country. Up to the time the present commission was created, five years ago, only desultory attempts had been made to improve the roads. Plank had been used in some places and an occasional road was surfaced with macadam. These early improved roads were universally in poor condition. They were not adapted to the heavy traffic in the vicinity of Detroit, nor had they ever been properly maintained. As a result they were very bad, some of them being almost impassable for much of the year.

Extended Use of Concrete Roads

The commission has for four years past constructed concrete roads almost to the exclusion of other types. Some macadam has been built, but the amount is being reduced each year and the intention of the commission, as at present constituted, is to build concrete roads even more extensively in the future.

In general, a minimum width of 24 ft. has been adopted for main roads near cities. Concrete is laid to a width of 16 ft. with a 4-ft. shoulder of gravel or limestone on both sides. The secondary roads have a minimum width of 24 ft., the concrete being 15 ft. in width, with shoulders on both sides, the same as in the case of the trunk roads. Tributary roads have a minimum width of 24 ft. with 12 ft. of concrete, 4 ft. of gravel or stone shoulder on each side and the balance of the shoulder of earth. The concrete is mixed in the proportions of 1 part Portland cement, 1½ parts washed sand and 3 parts from ¼ to 1½-in. well-graded washed gravel. It is laid to a minimum depth of 7 in., with a transverse contraction joint every 25 ft. These joints are protected by a special punched angle-iron construction patented by the R. D. Baker Company, of Detroit.

The materials used are all shipped into the country over various railroads. The problem of handling them from the nearest railroad siding to the point where work is in progress has been one of the principal difficulties in keeping the work continually in progress. In many cases the nearest railroad siding is several miles from the end of the road to be improved. The nature of the work requires that the permanent road construction be started at the distant end of the improvement and advanced toward the base of supplies. This means that practically all hauling must be done over unimproved roads. On account of this condition and the length of haul, special attention has been given to means of unloading and delivering materials.

Operation of Locomotive Cranes

Two 3-ton Brown-Hoist locomotive cranes were installed early this season to unload the sand, gravel and broken stone from the gondola railway cars in which it is delivered. These cranes were designed specially for this service. Each of them has a 4-wheel truck and is arranged to travel on a standard gauge track or on plank laid on the ground. Broad traction tires shod with cleats are provided, and at the inner edge of each wheel is a flange, set to standard gauge. Each crane has a 20-ft. steel boom and is equipped with a 1-yd. Brown-Hoist grab bucket.

The cranes have proved to be remarkably efficient in service. They are moved about from railroad siding to siding as the work progresses. When the distance is short they are simply hooked on behind a road roller and hauled to the next job. For long moves the cranes are loaded on flat cars. The number of shifts has been very limited, however, since the materials for a long stretch of road generally are delivered from one siding.

The cranes are operated alongside the cars in which the materials are delivered, running either on a parallel track or on the ground. The arrival of the cars of material is unavoidably very irregular. For some days no cars are received, while again a great number will come in a very short time. Before the cranes were installed the materials were shoveled out of the cars into wagons by hand. Just as long as possible the wagons delivered directly to the point where work was in progress. When congestion occurred the sand, gravel or stone had to be delivered to stock piles close to the siding and then reloaded for delivery to the work. This double handling was expensive, but it was found better than to tie up the construction gangs on account of lack of supplies.

With the advent of the cranes the cost of material handling has been greatly reduced. The cranes unload the material from the cars to wagons for direct delivery so long as wagons are available. When the wagons do not arrive promptly the cranes deliver the materials from the cars directly to storage piles. Later the cranes reclaim the materials from these piles to wagons when no cars are on the siding. The cranes load the wagons in a fraction of the time required when hand shovelers were employed. The cost of handling also has been much reduced over what it was with hand labor. The commission handles about 1000 cars of material per month during the busy season. The saving of demurrage made by the cranes is therefore large.

On account of the long haul and the character of the roads, the commission now delivers the bulk of the materials in 7-ton Port Huron steel wagons drawn by Port Huron road rollers. Sixty of these wagons and nine of the road rollers are employed in this service. The rollers draw one, two or three wagons depending on the condition of the road over which they travel. The average train is two wagons to the roller. It has been demonstrated that these trains are operated just as fast as a good team can walk under similar conditions. They are stated to work better than teams except when the road is muddy. The cost of hauling with the rollers and wagons also has been found to be less than when teams were used.

Most of the grading for the improved roads consists in surfacing and trimming up natural dirt surfaces. When macadam is encountered it is ripped up with a scarifier drawn by one of the rollers. All shaping up of the subgrade prior to rolling also is accomplished by means of Road King graders drawn by the rollers.

In building concrete roads the Commission employs eight traction Chicago cubical mixers. Three of these are of ½ yd. capacity, three of 1/3 yd. and two are smaller machines for culvert and bridge work. The concrete materials are winrowed along the side of the graded road, and are delivered in wheelbarrows to the charging device with which each mixer is equipped. The mixers discharge into buckets operating on a trolley beam suspended from the frame of the machine. The concrete is delivered directly from the mixer to place by means of this bucket on the trolley, the range of the machine being 20 ft. through an angle of 180 deg.

The supply of water for the concrete road construction operations has been of special moment. Each concrete crew requires about 15,000 gallons of water a day. Sources where this amount of water can be obtained are so rare in the country that it has been necessary to pump water as much as six miles. The average distance water has to be pumped for all of the work is more than two miles. For this water service ten Fairbanks-Morse gasoline engines have been provided. Each of these pump and engine outfits delivers to a 2-in. supply line, having connections every 400 ft. Each outfit costs $3.50 a day to operate, exclusive of interest and depreciation, and eliminates 6 to 10 teams. The pipe is in 8-ft., 12-ft. and 24-ft. lengths connected up with unions. The pump and engine of each outfit is mounted on a timber platform, which is readily portable. The outfits and the pipe lines can thus be shifted when each job is completed.

The Commission maintains near the center of the county two large storage and repair buildings. All ordinary repairs to equipment are made at this point. During the winter the equipment also is stored and overhauled in these buildings. The concrete culvert pipe used by the Commission likewise is manufactured and cured at this point.

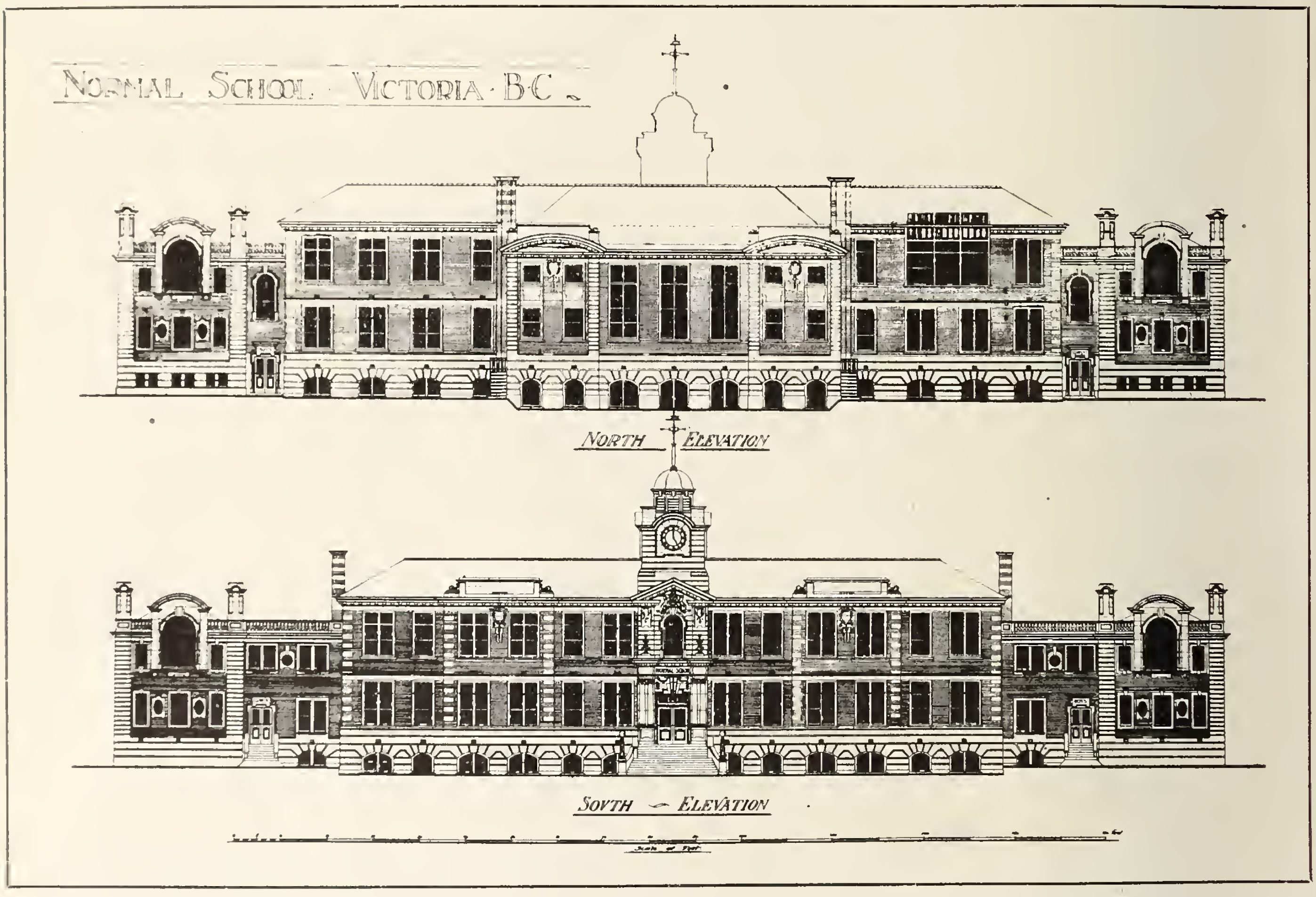
In a paper dealing with the subject of the deposit of scale and the purification of water used in locomotive boilers, which is referred to in the columns of the Railway Gazette, the author dwells on the advantages of washing out the boilers with hot instead of cold water. It has, he says, been proved that washing out with hot water not only reduces the time a locomotive has to stand idle, but also its cost of maintenance. The system is superior to that of using cold water, but neither method suffices for removing hard scale which is deposited on the tubes and other inaccessible parts of the boiler. On the other hand the materials which later on form hard scale are suspended in the water, and when the boiler is generating steam briskly they collect chiefly at the surface. That is why the timely removal of this scale-forming matter, as and when it separates from the water, prevents hard and thick incrustations from being formed in the water, seeing that the water proper will then remain nearly always clean. Of all the methods known, says the author, a high temperature is best for separating from the water any solid substances dissolved in it. As those substances are generally very light, they rise to the surface of the water and are kept there by the bubbles of steam which escape.

An international building trades exhibition is to be held at Leipzig, Germany, next summer. It is expected that the exhibition will open early in May and will continue until the end of October. The exhibition is under the patronage of the King of Saxony and is to cover everything in connection with the construction and equipment of buildings. Special supplementary exhibitions are to be arranged devoted to subsidiary branches, such as lighting, glass, frescoed rooms, tapestried rooms, etc. A special department of science and art has been established in which, in a special building, exhibitions will be grouped by subjects and not by exhibitors.

An example of wild bidding in German contracting is reported in the journal "Armierter Beton." A railway contract involving something over 100,000 cu. yd. of earthwork was opened for bidding. Twenty-six bids were received. The lowest bid was 46,340 M., and the highest bid was 192,775 M. The other 24 bids ranged between 48,000 and 103,000 M.

Proposed Normal School, Victoria, B. C.

THE proposed Normal School, at Victoria, which the provincial government of British Columbia is about to erect, will be a handsome architectural addition to the city. The new building will beasure 300 feet by 70 feet, and will be erected on a seven-acre site at the corner of Mount Tolmie and Lansdowne roads. It will be two storeys in height, with a high basement storey, with short wings at either end, and a square tower rising from the centre of the front elevation. Steel frame and red brick are used in the construction, with facings of Haddington Island stone. A flight of granite steps will lead to the main entrance which is of stone. Wood block and reinforced concrete slabs are used on all floors, excepting the corridors, which will be of terrazzo tile. Fibrous plaster decoration is used in the central hall, while the main entrance and main corridor will have a marble dado. Tiled dados are used throughout with the exception of the central hall, which will be panelled in hardwood. Interior trimmings will be entirely of hardwood. All flats are of reinforced concrete covered with mineral asphalt. The interior arrangements include class rooms, manual training shop, cloak rooms, music rooms, gymnasium, and an auditorium measuring 35 x 18 feet. Of the sixteen sets of plans for the Normal School submitted in public competition, those of Mr. W. C. F. Gillam, Vancouver, were accepted by the provincial government on the recommendation of the judges, Messrs. Rattenbury and Cox.



Floating factories are under consideration for the development of industries utilizing forest products in certain parts of India which are inaccessible except by waterways navigable by craft of considerable size. In the case in point the raw materials exist in large quantities along the banks of the streams, in some instances in sufficient amount to warrant the erection of large stationary plants, but financial and other considerations have so far prevented this. One application of the floating plant is in a sawmill to prepare some of the most useful timber in such shape that it can be economically packed and shipped to the principal consuming points. Another is in the preparation of tannin extracts, and a third which has been considered is the baling of jute. It is proposed to install machinery for these various purposes on large flat boats, of a type extensively used on Indian rivers, having a length of about 200 feet, a beam of 27 feet, depth of 8½ feet and draft of about 5 feet, with a load of 470 tons. This plan offers a suggestion for application in some detail to many developments of the resources of land adjacent to streams where the lack of transportation facilities for carrying away the crude materials, or of suitable conditions for fixed plants, would otherwise hinder that development.

The Age of Brick

Brick is the oldest building material known to man. The earliest authentic record of the use of brick for building purposes occurs in the Bible and refers to the building of the tower of Babel more than 4000 years ago.

"And they said, one to another, go to; let us make brick and burn them thoroughly, and they had brick for stone and slime they had for mortar. And they said, go to, let us build us a city and a tower, whose top may reach unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth."

This is a quotation from Genesis, chapter xi, verses 3 and 4, and is the first mention of brick as a building material to be found in the sacred book.

The history, then, of burned clay is as old as civilization, and this quotation from the Bible refers as above noted to the building of the tower of Babel. Had it not been for the discovery of burned clay much of the oldest history of the world would have been lost, for by preserving its own history it has also preserved information that is the basis of all history.

Practically all of the important and dependable records in existence, more than 4000 years old, are on burned clay. Everything else of written history from those remote ages has long since been destroyed.

The Pemberton Block at Victoria, B. C.

THE Pemberton Block, situated on Broad, Broughton and Fort streets, Victoria, B. C., is an excellent example of modern reinforced concrete construction. The building measures 88 x 120 feet and is six storeys in height, with full basement. All the floors are finished in terrazzo tile, with concrete flooring in offices. The main entrance is decorated in marble and tile. All stairways are concrete with marble treads. Fir is used as inside finish throughout. A feature of this building is the roof over the billiard room which is of clear span construction, allowing a room space of 52 x 65 feet without a column, concrete beams spanning the entire width. The Kahn system of reinforced concrete, furnished by the Trussed Concrete Steel Company of Canada, was employed in the construction. Messrs G. C. Mesher & Company, of Victoria, prepared the plans and also had charge of the construction work.

Pemberton Block, Victoria, nearing completion

The new Western Union Building, New York, which is to be twenty-six storeys high, will have foundations on pneumatic caissons sunk to bed rock, which at the site is found at an average depth of 72 ft. below the street curb. The basement level is to be carried down 62 ft. below the curb This will be 30 ft. below water-level. As the surrounding buildings are heavy, massive stone structures, some of which are 11 storeys high, and as the foundations of these buildings are on what is known as spread footings which rest on the soil not more than 20 ft. below the curb, the work to be done for the foundations of the new building will have to be carried on with extreme care.

Strength of Building for Slate

A booklet published by a U. S. slate firm includes a few paragraphs relative to the strength of building for slate. "A great many people," says the writer, "have the erroneous idea that a building should be constructed much stronger for slate than for other kinds of roofing material. This is a great mistake, as any building strong enough for shingles, tin or iron, is strong enough for slate, for the following reasons: The weak points of any roof are the valleys or other breaks in the roof where the snow drifts in and lodges, and when the snow melts with rain, the weight, at points where the snow has drifted, is much heavier than any two slate roofs.

It is well known that snow will not stick on a slate roof as it will on shingles or on a metal roof, as the slate being of a warmer nature, causes the snow to melt and slide off, while with shingles or metal it freezes on, causing greater weight than a slate roof is ever called upon to bear.

Two by six rafters, 18 ft. long and 2 ft. from centre, give a roof frame all the strength necessary for a slate roof.

The writer has seen hundreds of houses roofed with slate where the rafters were 2 by 4 in., placed 2 ft. on centre and 16 ft. long, with collar beams nailed across one-third of the way down from the top.

Leaving aside the question of snow and ice—as slate weighs only about six pound to the square foot of roof surface, any roof structure unable to bear the weight is so flimsy that it is not safe to live under.

As slate can be depended upon to make a roof perfectly watertight on any pitch down to one-fifth, the claim that your roof may not be steep enough is also without foundation.

Although acetylene gas was discovered in 1836 it was not until 1892 that its commercial development was made possible by Willson, who discovered a method of producing calcium carbide in large quantities. The application of acetylene to heating and power has been very recent indeed, and the use of acetylene and oxygen in the blow-pipe has produced almost the highest temperature known to chemistry—a temperature approximating that of the electric arc, probably above 6000 deg. Fahr. Through this means welding has been successfully accomplished and several other important industrial applications have been found. Large steel bridge girders can thus be cut apart with ease.

A report issued by the United States Government Bureau of Standards states, as the result of tests, that the permeability of concrete is not dependent entirely upon the quantity of cement used in proportion to the total amount of aggregate, but depends also upon the ratio of large to small particles in the aggregate. The same tests showed that concrete can be made practically water tight or impermeable under any hydrostatic head up to 10 feet, without the use of integral waterproofing materials, but that to secure concrete of this character considerable care must be used in selecting, proportioning and mixing the materials.

Activity Well Maintained at the Coast

Conditions Never Better—Outlook "Extremely Favorable"—Important Plans Projected and Under Way—The Work in Hand

(Correspondence of the Contract Record)

Office of the Contract Record,
Vanciuver, Oct. 2, 1912.

BUILDING and general constructional operations at Vancouver are still progressing vigorously. Numbers of important works in the city, including the Rogers and the Burns Blocks, are now all but completed, and work on many other large buildings is advancing rapidly. Remarkable activity is evident throughout the various municipalities where the demand for dwellings shows every indication of being steady throughout the winter months. The number of projected buildings is being maintained, and the outlook for a busy fall season in constructional circles is extremely favorable.

The Norton-Griffiths Steel Construction Company has lately been awarded the contract for the construction of the new addition to the Vancouver Club. The new addition will be built adjoining the present quarters on Hastings street west, and when completed will cost in the neighborhood of $250,000. Just half of the plans of improvement are to be proceeded with at present. Later, it is intended to erect a similar structure to that now planned. Messrs. Sharpe & Thompson are the architects.

Construction will soon be started on a six-storey reinforced concrete and steel apartment block to be erected in the 2,000 block, Granville street, by the Cook Construction Company, Ltd. Mr. W. Dodd prepared the plans for this building, which will cost approximately $200,000.

A prominent official of the C. P. R. recently announced the company's intention to erect a new immigration and detention building at the Empress dock, Vancouver. Increased immigration is responsible for the decision arrived at. The cost of the new building providing the enlarged facilities will be about $300,000.

The building, fire and police committees, of the Vancouver City Council, have finally decided upon the erection of a five-storey building to be occupied as police headquarters. Provision has been made for an additional three storeys if required. It is unlikely that the contract will be let until the third week in October there being a number of alterations to be made by the architect, Mr. W. A. Doctor. By-laws have been passed for this purpose to the amount of $240,000, of which $25,000 will be spent on the erection of a public morgue, in connection with the police headquarters.

A three-storey steel and mill construction building is being erected on Davie street, Vancouver, between Burrard and Thurlow streets, at a cost of $75,000. This building will contain a dancing academy and apartments. The foundation and frame work are being cosstructed strong enough to carry three additional storeys if necessary. Pressed and sandstone will be used for facing, the whole resting on a granite foundation. The entrance lobby will be furnished

The Fairview district of Vancouver is rapidly assuming importance as one of the foremost residential sections of the city. Amongst the number of recently completed buildings in this district is Shaughnessy Lodge, an apartment block situated on the corner of Tenth avenue and Birch street. It covers a lot 100 feet by 125 feet, and is four storeys in height The building has a concrete base, and brick walls above faced with paving brick. There are 68 suites in the building, the cost of which is $100,000.

in marble and tile, and a flight of marble stairs will give entrance from this into a large foyer. The main dance hall, situated on the ground floor, will measure 90 x 62 feet, and will be pannelled in oak to about half the height of the room. It is surmounted by plaster, which will be ornamented near the ceiling. Messrs. J. J. Dissette & Company are the contractors for this building; Mr. Thomas Hooper prepared the plans.

It is the intention of the Canadian Pacific Railroad to begin construction in the near future of a two-storey brick and concrete building on False Creek, Vancouver. This structure will be used as the storehouse for the dining car department and will cost approximately $75,000. It will measure 50 feet by 200 feet.

Work will be commenced at an early date on the construction of a five-storey apartment block on Beach avenue, Vancouver. The building will be of mill construction, with granite foundations. The interior facings are red shale brick trimmed with granite. The entrance hall is to be decorated with marble and tile, and the interior finish throughout will be fir. The building will measure 66 x 132 feet, and is estimated to cost $80,000. Messrs. Townsend & Townsend are the architects.

Construction work will shortly be commenced on a three-storey apartment house, stores and office building at the corner of Granville street and Fourteenth avenue, Fairview. The building will be of mill construction, with a frontage of 54 x 122 feet. The exterior facing will be of pebble dash, trimmed with cement, tile and galvanized iron. Five stores are to be situated on the ground floor. The cost is estimated at approximately $50,000. Messrs. Braunton & Leibert are the architects.

The work of bricking the Vancouver Arena Building was commenced recently. Red brick, trimmed with cut stone is being used for the entire structure, excepting the entrance, which will of buff brick trimmed with the same stone. This building is used as an artificial ice rink with a seating capacity of 10,000. It cost $285,000 and is said to be the largest structure of this nature on the continent.

Excavation work has been commenced on Main street. Vancouver, for a new six-storey store and office building which will represent an expenditure of approximately $65,000. This building will measure 25 x 120 feet and will be of reinforced concrete construction, with the front finished in terra cotta, inlaid with marble panels. Marble is to be used in the finishing of the vestibules and corridors, and fir as inside finish throughout. Messrs. Braunton & Leibert are the architects.

A permit was granted recently for the erection of a four-storey store and rooming house to be erected in the 700 block on Seymour street, Vancouver. The structure will be of reinforced concrete construction faced with brick and terra cotta. Messrs. H. L. Stevens are the architects and contractors. The building will cost approximately $65,000.

It is generally credited in Vancouver that the C. P. R. are preparing plans for the construction of a tunnel under the city from the foot of Burrard street on Burrard Inlet to the False Creek yards. This tunnel was first mooted several years ago, and has been mentioned recently in conferences between the railroad company and the city. It is being considered as a means of doing away with the present street crossings in the heart of the city. It is stated that the tunnel will be 4,500 feet long, and from thirty to fifty feet below the surface and will cost in the neighborhood of $2,000,000.

The Vancouver City Council recently accepted the design of Mr. C. A. P. Turner, of Winnipeg, for the Georgia-Harris street viaduct, and construction work will be commenced as soon as the working plans are completed. Mr. Turner's estimate for a steel and concrete bridge of the mushroom type was $457,600. The design provides for a bridge 2,800 feet long and 66 feet wide. For 700 feet over the tracks of the Canadian Pacific Railway it will consist of continuous structural steel girders of the Warren type, each girder to be incased in concrete. Spans of from 120 feet to 160 feet long will be required in this section. The remaining portion, 2,100 feet long, which is to be of concrete mushroom construction, will consist of a series of spans, 40 feet long, with the exception of a large arch 100 feet long over False Creek. The entire floor is to be of concrete.

The Canadian Northern Railway Company has announced its intention to shortly begin the erection of an eight-storey office building at the corner of Fort and Government streets, Victoria. The company has already purchased the property and it is stated that plans for the proposed structure will be prepared immediately.

The announcement is made from Seattle that the Puget Sound Bridge & Dredging Company of that city has been awarded the contract by the British Columbia Electric Railway Company for the construction of a large dam on the Jordan River, Vancouver Island, the estimated expenditure being $500,000. The dam will be 800 feet long and 115 feet high. It will be of the Ambursen type of reinforced concrete construction. The construction plan was chosen by G. R. G. Conway, of the B. C. Electric after thorough consideration of the respective merits of solid concrete and other forms of dam. The undertaking represents part of the development plans of the B. C. Electric on the Jordan River hydro-electric project. The generating station was opened last year with a unit of 6,000 horse power in operation and another unit of 6,000 horse power now being installed at the plant. The plans of the company for the station contemplate a total output of 36,000 horse power.

On September 7th the electors of Point Grey municipality granted a franchise to the British Columbia Electric Railway Company for the operation of a street car system through that district. The term of the franchise is for 37 years and 6 months, with a separate clause covering a through line across the district for a term of 99 years. The granting of this franchise closes a long drawn out controversy concerning transportation facilities in Point Grey. A few years ago a franchise throughout the district was granted the company by the council, but this was quashed by the British Columbia courts, and is now the subject of an appeal by the company to the Privy Council. Last January a tram franchise by-law was submitted to the electors and was defeated, and a council was elected which was in opposition to the granting of the franchise. An attempt was made to operate a motor bus line as a municipal undertaking, but this was unsuccessful and the project abandoned after a short trial resulting in a considerable loss to the municipality. The ratepayers then requested the council to again submit the tram franchise by-law almost identical in terms as that which was defeated last January. This was done as noted, the measure being proved at the polls. Immediately upon the announcement of the polls the company commenced operations upon the various lines in Point Grey where service had been given previous to the quashing of the prior franchise. The tram agreement calls for numerous extensions of the lines throughout the district and plans for the construction of these are now being made. The Point Grey system will be operated in connection with the Vancouver lines. Throughout Point Grey the passing of the by-law is hailed with great satisfaction as the district is a suburb of Vancouver and affords excellent opportunity for suburban homes. It is now believed that the development of the district, which has been held back during the present year because of lack of transportation facilities, will be extremely rapid.

On September 3rd the head office of the British Columbia Electric Railway Company in Vancouver, B. C., was removed from the temporary quarters in the Holden Block to the company's new office building and terminal station at Hastings and Carrall streets. The new building is five storeys in height, with an area of 15,000 feet of floor space on each storey. The block is admitted by all to be one of the finest office buildings in the city. The fittings of the building throughout are of the best type and the building now affords a proper and fitting home for the accommodation of the staff of the largest corporation in British Columbia which operates exclusively within the boundaries of the province. The total cost of the building is about $420,000.

The British Columbia Electric Railway Company is at present constructing an extension to its sub-station on Main street in Vancouver, this being the principal sub-station of the company. The plans call for a building of reinforced concrete and brick construction, on the north side of the present sub-station 50 by 120 feet in size. At present the building will be only two storeys in height, but the foundations have been made sufficiently strong for two or three additional storeys as the need develops. The cost of the building will be about $40,000. When completed a full set of sub-station equipments will be installed, to be operated in connection with the equipment of the old building. The transformers and controllers will be located on the ground floor, and the switching apparatus and high tension equipments on the upper floor.

Cheap Trip to Highway Convention

New Westminster, B.C., October 1.—Special rates have just been arranged with the Canadian Pacific Railway for all delegates and members attending the convention of the Canadian Highway Association in Winnipeg, from October 9 to 12. All delegates are required to purchase a full fare single ticket to Winnipeg and get a receipt for this from the agent, the receipt to be exchanged later for return transportation, after having been properly certified by the secretary of the association.

The one-way ticket for the round trip is good only in case there is an attendance of one hundred or over at the convention. If there is less than one hundred, one-third of the regular return fare will be charged. The attendance will probably be greatly in excess of the required number, and arrangements have been made for a hall that will easily hold four hundred people.

Mr W. J Kerr, President of the Canadian Highway Association, is now in Winnipeg arranging some of the final details and interviewing a few of the prominent speakers who have consented to address the meetings. A large number of photographs secured by the official photographer of the association, and also scenes showing Mr Thomas W. Wilby in his automobile trip across Canada, have been made into lantern slides and will be used to illustrate lectures at the convention

Mainly Constructional

The News in Brief—From the Atlantic to the Pacific.

Sir William Mackenzie has definitely decided to build a street railway in Stratford, Ont., and work will probably be started at once.

Brick clay has been found on Toronto's new jail farm on Yonge street. Samples of it have been secured and sent to an expert to be tested.

The capital stock of the Canadian Northern Montreal Tunnel & Terminal Company, Limited, has been increased from $50,000 to $5,000,000.

The contract for the construction of the Montreal filtration plant from Mr. F. McGuigan to Mr. N. McLeod has been approved by the City Council.

A reorganization of the bond capital of the Missisquoi Marble Company, Montreal, is in contemplation, in order to provide money for the company's operations.

Forsyth Pulverizer, Limited, has been incorporated with a capital of $250,000 to manufacture and deal in pulverizers and road-making machinery. The head office is at Toronto.

Among recent Montreal incorporations we note Messrs. C. E. Deakin, Limited, contractors, with a capital of $500,000, and the Siemens Company of Canada, Limited, with a capital of $100,000.

It is reported from Quebec that it has been decided to reduce the membership of the Harbor Commissioners from nine to three, and to remodel the Board on the same basis as that of Montreal.

The rise of Weyburn, Sask., has been remarkable. In 1900 the population was twelve; to-day it is five thousand. The total value of building permits issued since April of this year is $645,000.

The Mount Denis Brick Company, Limited, has been incorporated with a capital of $200,000, to manufacture and deal in lime, brick, clay and other building material. The head office is at Toronto.

International Engineering Works, Limited, has been incorporated with a capital stock of $1,500,000, to carry on business as mechanical, electrical and hydraulic engineers, with head office at Montreal.

The widening of College street, Toronto, from St. George street to Yonge street will be taken up by the Guild of Civic Art in the near future, and a bill authorizing the same submitted to the Ontario Legislature.

Five tenders have been submitted for the construction of the breakwater at Victoria. Tenders are to be received at Ottawa until October 15, and it is anticipated that the successful bidders will be known soon after that time.

For the month of September the Montreal building permits were valued at $2,146,018, an increase of $988,142 as compared with the same month last year. The total for the year is $13,325,394, a gain of $1,815,964 as compared with 1911.

The town council of North Toronto are applying to the Railway Board for permission to raise $85,000 for sewage purposes. This is the amount by which the estimates were exceeded in the sewer works. The sewerage system is now completed.

The Montreal Council, by 18 votes to 7, have decided to seek authority to repeal the local improvement tax, under which the cost of pavement is paid by owners of property. The Controllers opposed this, on the ground that it was putting too serious a burden on the city. The reasons which actuated the legislation committee in recommending the repeal were accepted by the council, viz: that the city would have money enough out of the loan account to do all public improvements without having recourse to special taxation.

The amount of building permits has fallen considerably in Moose Jaw during September, only $75,000 worth having been issued. It is anticipated, however, that the total for the ten months ending October, will be very close to the four and a half million mark.

Rapid progress is being made in the erection of a ten-storey reinforced concrete building at the corner of Granville and Georgia streets, Vancouver, at a cost of about $500,000, for Messrs. Henry Birks & Sons. Terra cotta and granite will be used to face the building.

Owing to unfavorable weather conditions, prospects are not very bright for completing the new water system for Moncton, N.B., this year. The heavy and continuous rains have greatly retarded the work on the dam. The scarcity of labor has also contributed to the delay.

Messrs. Dartnell, Limited, Montreal, are supplying the face brick for the Herald Building, Calgary, "Caledonian" grey matt brick made by Fiske & Co., Inc. . The architects are Messrs. D. R. Brown and Hugh Vallance, and the contractors Messrs. Fyshe, Martin Co., Ltd.

Messrs. H. S. Holgate, E. Alex. Wright and R. S. White have been nominated to inquire into alleged over-expenditure on a fire station constructed by the Westmount, P.Q. Council. The nominations were made by the Municipal Association at the request of the Council.

The Montreal House Construction Co., Ltd., a new concern, is offering $50,000 preferred, with a bonus of 25 per cent. common, out of a total capital of $100,000 preferred and a like amount of common stock. The company is going into the general construction business.

The architects of London, Ont., and a few others, will be asked to submit plans for the new city hall. The sum of $130,000 is all that the city council have reserved for this building, and it is thought that this will not be sufficient. The site is at the corner of Dundas and Wellington streets.

Calgary's building permits to the end of September totalled nearly sixteen millions, as compared with $10,860,978 for the same period last year. Last month's permits, which included those for the C. P. R. shops, represented an expenditure of $4,170,360, as compared with $903,210 for September, 1911.

The Franco-Belgique Investment Company are asking the town council of St. Lambert, just outside Montreal, for a franchise for a waterworks, but there is great opposition to the scheme. The company's charter includes power to acquire in addition, franchises for gas, light, tramways, and water powers.

The personnel of the Pacific Great Eastern Railway formed recently, is as follows: Mr. J. W. Stewart, president; Mr. P. Welch, vice-president and general manager; Mr. D'Arcy Tate, vice-president and general counsel; Messrs. V. W. Smith and D. McLeod, directors, and Mr. R. D. Thomas, secretary-treasurer.

A number of amendments to the charter of Montreal have been passed. These will have to be approved by the Quebec Parliament. They include power to establish parks and boulevards; the right to take over private streets and improve them; municipal autonomy, the redistribution of wards, and permanent pavements.

The order-in-council remitting half the duties on cement applies until the end of next month. The Cabinet has not yet decided whether or not to continue the remission beyond October 31st, but present indications are that the order-in-council will be renewed until the end of the year.

The remission has proved very popular, and the Canadian cement manufacturers do not seem to be raising very much objection to it since the demands of the home market and the shortage of supply in the States have combined to keep prices up practically to the old level, despite the lower duties.

The cities of Port Arthur and Fort William have had their attention called to the new Public Health Act of Ontario, which says that no inland towns or cities shall pollute the waters of inland rivers or lakes with sewage. They have commissioned Mr. T. Aird Murray to make a thorough investigation into their sewage system.

The Victoria council have not yet decided to engage Mr. Thomas H. Mawson, the well-known landscape architect, to prepare plans for their parks and open spaces. As far back as April last, a contract was drawn up for Mr. Mawson to sign, but the matter has been held in abeyance since that time owing to the objections raised by some of the aldermen.

Victoria is to have a new Y. W. C. A. building at the corner of Quadra street and Caledonia avenue. The structure will be of reinforced concrete, thoroughly fireproof, with a single but effective treatment of brick and terra cotta finish. It will be equipped from top to bottom with all modern fire protection apparatus, and will cost in the neighborhood of $150,000.

It is expected that tenders will be called for the $2,000,000 legislative building in Winnipeg this fall and the work on the foundations commenced. As mentioned in our last issue, Mr. F. W. Simons' plans have been accepted. The four unsuccessful candidates will each receive $2,000 as some compensation for their work in preparing detailed drawings from their original sketches.

Corporation Agencies, Limited, of Montreal, have purchased the properties of the Robb Engineering Company, Ltd., at Amherst, N.S., sold under order of the Supreme Court of Nova cotia. A new company has been incorporated with the name of the International Engineering Works, Ltd. It is reported that the works are very busy, having lately received some big orders.

In reference to the various good roads movements throughout Canada, it is of interest to note that the automobile manufacturers of the United States have agreed to contribute one-third of one per cent. of their gross returns during 1913 for the good roads cause. This will, it is expected, create a fund of $15,000,000. A similar resolve on the part of Canadian automobile manufacturers would be another practical way of showing their activity in promoting good roads.

A conference is to be held at Vancouver, in a few weeks, between Mr. R. T. Elliott, K.C., representing the Westholme Lumber Company, Limited, and the council, regarding the matter of the Sooke waterworks. At this conference the question will be decided as to whether an investigation will be held as requested by the water commissioner and consulting engineer, who alleged that in Mr. Elliott's observations on royalty for the manufacture of pipe could be read a reflection on their conduct.

Five hundred thousand dollars is the estimated cost of the McLeod building to be erected at Rice street and McDougall avenue, Edmonton, Alta. The structure will be 100 by 113 feet, nine storeys in height and full basement with six store rooms on the ground floor and 155 offices above. The steel frame construction will be of the curtain wall type, the exterior being finished in light colored glazed terra cotta with pressed brick trimmings. The interior will be finished in quartered oak with oak floors. The main entrance is to be finished in marble. The building will be equipped with three elevators, run by high speed electric traction motors, and equipped with the latest approved safety devices. The owner, Mr. K. A. McLeod, already has applications from prospective tenants for more than half of the offices in the building and it is expected that every room will be rented before the structure is completed.

During the winter, Montreal is faced with the problem of disposing of the snow. It used to be dumped on public land and last year a large quantity was thrown into the river. Next winter it is proposed to dump much of it into the main sewers, and $9,000 has been voted for making special openings in the trunk sewers, large enough to let in a load of snow at a time. Only the large sewers will be utilized, where the flow of water is sufficient for the purposes required. The manholes will be 4 ft. wide and 8 ft. long.

Plans for the twenty-odd buildings which will compose the new two-million-dollar barracks at Long Branch, Toronto, are now nearly completed and will be in shape to call for tenders, if the Government so desires, by the end of next month, after a delay of three years. The actual work of construction will not begin until next year, and it will probably be at least three years before the buildings are completed. Meanwhile Toronto will probably have to wait for the transfer of the present site of Stanley Barracks to the city for park and Exhibition extension purposes.

The Western Trusts Company will erect a large business building next summer at Jasper avenue and Third street, Edmonton, on a site now occupied by the old Presbyterian church, the present headquarters of the central departments of the municipality, according to Mr. A. J. Adamson of Winnipeg, who is in Edmonton with Mr. J. A. Thompson of Winnipeg, president of the National Paving and Construction Company, which has several large contracts in Edmonton, and Mr. J. G. Turriff, a member of parliament for the constituency of Assiniboia.

There is still a great scarcity of brick in the Montreal district, and the local yards have more business than they can handle. Brick is now in great favor, as compared with a few years ago, and to supply the demand large quantities have been imported from the United States. Owing, however, to the congested traffic conditions the delivery has been slow, and complaints are made of the poor transportation facilities. The building boom is of course responsible for the greater requirements for brick, and orders from Montreal to some Ontario brick companies have been declined on the ground that it is impossible to fill them in a reasonable time.

Instead of a Royal Commission, the Westmount, P.Q., Council have asked the Municipal Association to nominate three members to investigate charges of extravagance brought chiefly by ex-alderman McBride. It was alleged that engineering works estimated to cost $77,771 actually cost $123,629, and Mr. A. Currie, the city engineer, came in for some sharp criticism. A statement by Mr. Rutherford, the Mayor, put another complexion on the position; of $193,514 worth of work the estimates were $189,653, a credit of $21,153 and debit of $25,342, the total net deficit being $3,889, or just over two per cent. of the estimated amounts. Of certain items fourteen were made up by Mr. Currie and twelve by his predecessor, Mr. Fellowes, "and" remarked the mayor, "those of us who are connected with the building trade know that estimates made two years ago could not possibly be completed at the same cost to-day." A committee which had inquired into an alleged over expenditure on a bridge suggested a system for placing a check upon cost accounting, and the city treasurer will prepare a scheme. It has also been decided that a monthly report will be prepared by the engineer showing the civic work done, with a comparison of the actual and estimated cost. The committee of the municipal association will inquire into the alleged excessive cost of a fire station.

Personal Mention

Mr Durham, vice-president of the John S. Metcalf Co., Ltd., Montreal, is on a business visit to England.

Mr. Roger Miller, of Messrs. Haney & Miller, Toronto, has returned to Toronto from Victoria, B.C., where he has been staying in connection with a tender for the breakwater.

Mr James Pears, the well-known brick manufacturer, of North Toronto, is at the General Hospital, Toronto, seriously ill with pneumonia.

Mr T. Aird Murray has been consulted by the cities of Port Arthur and Fort William, and the town of Kenora, as to the disposal of their sewage.

Mr. Samuels Fuller, of Stratford, Ont., died recently. Mr. Fuller was one of the pioneers of Stratford and had charge of many new railway enterprises for that city.

City Engineer Wright, of London, Ont., is suffering from bronchial trouble. He will ask for a month's leave of absence, his physician having ordered him away for a change.

Mr. R. D. Brown, City Engineer of St. Catharines, Ont., has resigned that position to accept an appointment on the staff of the new Welland ship canal, under the engineer in charge, Mr. J. L. Weller.

Mr. G. Hall Scott, of London, England, and Mr. Albert Brooks, Montreal, representatives of Sir John Jackson, Limited, of Edinburgh, are in Victoria to look over the site and complete investigations on which to base a tender for the work on the breakwater.

Mr. G. I. Evans, Mechanical Engineer of the Canadian Pacific Railway, Montreal, Que., has been appointed Superintendent of the locomotive shops at Angus, Montreal. Mr. Evans began engineering work as a draftsman with the Canadian Pacific Railway in 1900.

Mr. P. L. Fraser, Secretary of the Builders' Exchange of Toronto, attended the recent International Conference of Secretaries of Builders' Exchanges, held at Detroit, Mich. Mr. Fraser led a general discussion on uniform contracts and incidentally brought out the statement that over 100,000 copies of the contracts were sold last year.

The death of Mr. Henry Bulmer, who was for many years connected with the Montreal brick and building trade, has occurred at his residence, McKay street. Mr. Bulmer, who was 92 years of age, was prominently identified with the city's business; he was the chairman of the Harbor Board, and a member of the city council, besides being a very active politician. Mr. Bulmer lived under five British sovereigns, viz., George IV., William IV., Victoria, Edward VII., and George V., and he was sworn in as magistrate under England's three last rulers.

Looking to Canada

A visitor to Toronto last week was Mr. Jno. P. Wagner, sales manager of the Consolidated Expanded Metal Companies, of Pittsburgh, Pa. Reference to Mr. Wagner was contained in an article published in our issue of September 4, 1912, recording the fact that Messrs. Alfred Rogers, Limited, had obtained the exclusive selling rights in Ontario for the expanded metal manufactured by the above firm.

Mr. Wagner, who is a graduate of the University of Berlin, Germany, has had a long and varied experience in the engineering and constructional field. It is interesting to recall that he was one of the pioneers of reinforced concrete work in Canada. Among the most noteworthy work of the kind with which he was identified was that of the Simpson and Globe buildings. Not only in Canada but in the United States has Mr. Wagner been identified with reinforced concrete construction since its inception. He formerly had an extended practice as a consulting engineer and he has been associated with many undertakings of national importance, such as the 2-mile viaduct between the two Kansas Cities and the construction and reconstruction of much important work for the leading railroads, including the New York, New Haven and Hartford, the New York Central and the Pennsylvania railroads. As a further example of the wide scope of Mr. Wagner's experience, mention might be made of some of the most notable irrigation works in the West.

Mr. J. P. Wagner

Mr. Wagner's connection with the commercial side of engineering has been attended with signal success. He affords a rare example of the combination of high technical knowledge and executive ability.

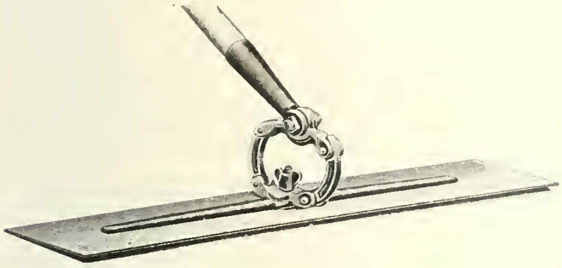
"Steelcrete in Canada"

Munderloh & Co., Ltd., Montreal, have been appointed sole agents for the province of Quebec for Steelcrete expanded metal, manufactured by the Consolidated Expanded Metal Companies, of Pittsburgh, Pa. The agency is being handled for Munderloh & Co. by Mr. J. A. Wilkens. It is claimed that Steelcrete is the oldest and most widely used concrete reinforcement, its distinctive feature being the cold drawn process by which it is manufactured. It is uniform in quality and stiffness, making a taut reinforcement and requiring no stretching to take the "waves" out of it. The original plate is of soft steel containing a low percentage of carbon, and in the finished product the ultimate strength has been raised 20 to 50 per cent., and its elastic limit increased by 100 per cent.

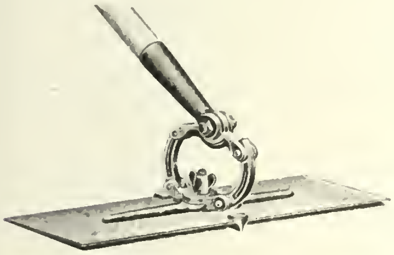
The diamonds or quadrilaterals of the sheet under severe loading tend to close, and the effect of this closing, in addition to giving the fabric ductility, is to introduce a compression into the concrete, which at this point is in tension. The immediate effect is to lower the neutral axis in the slab, which increases the effective area of concrete available for the resistance of compression stresses and decreases the stresses in the extreme fibres. Other advantages of Steelcrete are the perfect bond attained between the steel and the concrete and the perfect distribution of the steel.

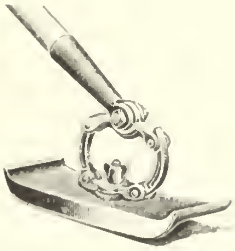
Cement Sidewalk Tools

The Abram Cement Tool Company, Windsor, Ont., are manufacturers and patentees of several cement sidewalk tools. The accompanying illustrations show the "Abram" finishing trowel, the "Abram" jointer, and the "Abram" edger. The finishing trowel has a twenty-four inch blade, a six-foot handle, and is equipped with the "Abram" automatic "Wrist Motion" device which, by a mere push or pull of the handle, gives that finish which is ordinarily accomplished by the workman with a twist of the wrist. This machine is far more speedy than the ordinary hand trowel and does away with the discomfort caused to the workman by having to kneel down. The "Abram" Jointer is a tool in a class by itself, and eliminates the necessity for a straight-edge and the wiping and cleaning up of the margin after the joint is cut, the operator always standing erect and finishing the joint with one stroke of the tool. It is also equipped with the automatic wrist motion.


24″ Abram Trowel.

The "Abram" Edger is an all-bronze tool, fully equipped with the six-foot handle and automatic wrist motion. Its form edge runs straight and smooth, turning an edge void of crooked lines. By giving a one-half turn on the central stem it can be reversed in a moment, thus making it a right or left hand edger as desired. A complete set of these three tools, finishing trowel, jointer and edger can be purchased for $21, or the prices of the single tools are $9.00, $8.00 and $6.00, respectively.


The Abram Jointer.


The Abram Edger.

English-Made Electric Elevators

Messrs. A. W. Penrose & Company, Limited, the English elevator firm, through their agents, Messrs. Stuart, Drinkwater & Hingston, Limited, have recently obtained a number of important contracts in the Canadian field.

The Penrose Elevator is being installed in the new ten storey building at the corner of McGill and Notre Dame street, Montreal, being erected by the McGill Property Syndicate. The contract calls for three powerful electric high speed elevators, each having various speeds under the control of the operator, thus effecting an economical service, together with a special flash light signal system. Mr. R. E. Bostrom is the architect.

In addition to this a Penrose elevator is being installed in the large Bishop Street Apartment being erected by D. L. Henault, the contract calling for passenger and freight elevators, together with a service of six dumb waiters. The dumb waiters are automatic in action and are a specialty of the Penrose firm. Mr. Chas. A. Mitchell is the architect.

A Penrose automatic push-button elevator, which can be operated without an attendant, is being installed in the new Prudential Trust Building on St. John street. Messrs. Finley & Spence are the architects.

An Attractive Tent Exhibit

The accompanying illustration shows the splendid exhibit of Messrs. J. J. Turner & Sons, Peterborough, Ont., at the Canadian National Exhibition this year, which proved one of the best and most attractive exhibits in that line shown on the Grounds. This long established and well-known firm has gained a reputation in the manufacture of tents and contractors, surveyors and lumbermen's supplies of all kinds. A few months ago to meet the demand of their rapidly increasing western business, they opened a branch in Regina, where they carry in stock all their leading lines. Some big contracts have been handled by the firm this season. They recently secured one of the largest contracts ever awarded in Canada for decorations. This is the decorating of the city of Regina for the visit of the Duke and Duchess of Connaught. The decorations covered about four miles of streets and took some thirty thousand flags and banners. Twelve hundred flour barrels and twelve hundred poles were used to put the decorations on. These had to be sent from the head office at Peterborough, as the poles could not be procured in Regina. These and other large contracts this year show the progressiveness of the firm.

Exhibit of Messrs. J. J. Turner & Sons at Canadian National Exhibition.

Plans are now completed for the proposed new theatre to be erected by the Sullivan & Considine interests on the site of the Vancouver Opera House, now undergoing practical demolition. The structure will be five storeys in height with a seating capacity of 1,900. The superstructure is of steel for which J. Coughlan & Sons have the contract. The front elevation will be faced in brick and terra cotta. Four floors above the auditorium and facing Granville street will be occupied as offices. The fittings throughout will be of selected materials. Mr. J. J. Donnellan is the architect. The estimated cost is $150,000.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Duck Lake, Sask.

Cement sidewalks to cost $10,000 planned by the Town Council. Sec., O. S. Densis. By-law will be voted on Oct. 10th.

Hamilton, Ont.

Water mains. Mayor, Geo. H. Lees. Engineer, A. F. Macallum. Council have authorized construction of water mains on following streets: Catherine, Glendale, Henry. Avondale, Fairleigh, Woodleigh, Roxborough, Burlington, Sherman and 12-in. connection under G. T. R. tracks at Trolley street..

Sewers. Mayor, Geo. H. Lees. Engineer, A. F. Macallum has been authorized to construct sewers on Kent street, and Aberdeen avenue. Work to be done by day labor.

Kamsack, Sask.

Sidewalks. By-law carried providing $13,000 for cement sidewalks; $5,000 for street grading and road improvements. Sec., John Bowes.

Moncton, N.B.

Watermain ½ mile of 12-in. Engineer, J. Edington. Tenders will be called.

Port Arthur, Ont.

Waterworks extension, cost $520,000. City Engineer, L. M. Jones. Consulting Engineer, T. Aird Murray, Lumsden Bldg., Toronto. By-law passed.

Rutherford, Ont.

Drainage for Township of Dawn. Clerk, J. M. Webster, Rutherford. Engineer, George McGublfin, Chatham. Tenders will be called shortly.

Revelstoke, B.C.

Water works to cost $10,000 planned by Town Council and ratepayers will vote on by-law.

St. John, N.B.

Sewer and watermain. Clerk, H. E. Wardroper. Commissioner of Water & Sewage, Rupert Wigmore. Engineer, Wm. Murdock. Concrete sewer in Union street from Charlotte to Carmarthen and 10-in. watermain in Duke St. from Germain to Prince William. Tenders to be called.

Watermains and sewers, Adelaide Rd. Sec., H. E. Wardroper. Commissioner of Water & Sewerage, R. W. Wigmore. Engineer, Wm. Murdock. Tenders were rejected and work may be done by day labor.

St. Mary's, Ont.

Additional water mains required for fire protection purposes. Clerk, Thos. M. Clark. Commissioner Curry has charge of matter.

Winnipeg, Man.

Granolithic sidewalk, William avenue from Isabella street to Tecumseh. Sec., M. Peterson. Plans and specifications at office of Engineer H. N. Ruttan.

Wynward, Sask.

Sidewalks to cost $10,500. Work under consideration. Sec., Frank A. Hueks. By-law will be submitted on Oct. 14, 1912.

CONTRACTS AWARDED

Hamilton, Ont.

Sewer pipes, etc. Engineer, A. F. McCallum. 1900 ft. of 30-in. reinforced concrete pipe at $2.05 per lin. ft. to The Lock Joint Pipe Co., Barton street E. two 30-in. sluice gate valves; one 48-in. sluice gate valve, to Canada Foundry Co., Toronto.

Sewers. Mayor, Geo. H. Lees. Engineer, A. F. Macallum. General contractor, J. D. Armstrong, 138 Erie Ave., for First, Edinburgh, Province and Argyle avenue. General contractor, T. Lawson, 209 Garth street S., for Burlington street and Main street.

Inverness, N.S.

Sidewalks for Dominion Government, Ottawa, Dept. of Public Works. Secretary, R. C. Desrochers. General contractor, Geo. Ross, Inverness.

Lindsay, Ont.

Drain to cost $12,000. Mayor, Dr. Wood. Clerk, D. Ray. Engineer, Geo. Smith. Tenders were received and rejected. Work is being done by day labor.

Medicine Hat, Alta.

Power plant and water works system to cost $41,000. City Engineer, A. R. Grimmer. Con. Engr., R. S. Lea. General contractors, N. T. Continental Jewel Co., New York, filter plant. Bldg., Fysche Martin Co., Calgary, Alta. Steel pipe, Munderloh & Co., 51 Victoria Sq., Montreal.

Port Hope, Ont.

Sewers on five streets, 3,373 ft. Clerk, J. W. Sanders. General contractor, W. G. Gibson.

Regina, Sask.

Paving and sidewalks. Clerk, A. W. Pool. 24,000 sq. yds. bitulithic paving to the Bitulithic Paving Co., at $3 per sq. yard; 10,000 sq. yds. asphalt paving, to the National Paving Co., at $2.90 sq. yd.; 8,000 lin. ft. combined curb and gutter to Western Pavers Ltd., at 74c. ft. 235,000 sq. ft. concrete sidewalk to Parsons Construction Co., at 17c. sq. ft.

St. John, N.B.

Repairing and laying sidewalks. Sec., H. E. Wardroper. Commissioner Pub. Works., M. E. Agar. Road Engineer, Geo. N. Hatfield, 122 Board street. Work will be done by day labor in charge of road engineer.

Winnipeg, Man.

Pump houses. Secretary, Board of Control, M. Peterson. Engineer, H. N. Ruttan, 223 James ave. General contractor, George A. Foster, 937 Pine ave. For erection of' two pump houses at wells Nos. 11 and 12, at $1,626.20.

Water mains, sewers and walks. Sec., M. Peterson. Engineer, H. N. Ruttan, 223 James avenue. General contractor, Thos. Jackson & Son, 370 Colony St. Granolithic walk on Martha street, sewer on Garfield street, $3,584.80. J. W. Astley, City Yards, water main on Saskatchewan avenue, Geo. Heg, 726 Alfred avenue. Sewer on Arlington street, also to J. Devitt; gran. walk on Talbot avenue and Tweed avenue, $1,974.40.

Railroads, Bridges and Wharves

Barrie, Ont.

Concrete culvert. Mayor, Alex. Cowan. Tenders received by engineer, K. S. McDonnell, 689 ft. long, approximately 500 cubic yards.

Farnham, Que.

Bridge for Central Vermont. Railway. Foreman, H. J. Schoolcraft, Farnham, Que. The Board of Railway Commissioners have authorized reconstruction of bridge across Yamaska River near Farnham, Que.

Hamilton, Ont.

The City Council have served notice on Hamilton Street Railway Company to construct a number of extensions.

Limehouse, Ont.

Bridge will be erected for G. T. R. Engineer, H. R. Safford, Montreal, Que. The Board of Railway Commissioners have authorized the work.

Montreal, Que.

Railway extension. Chief Engineer, A. F. Stewart, Toronto. The Board of Railway Commissioners have approved of location of C. N. O. R. through Counties of Jacques Cartier and Hochelaga and part of city of Montreal, mileage 43.56 to 55.23 from Hawkesbury.

Port Arthur, Ont.

Extension of street railway, cost $38,300 on Queen street from Algoma to High street and from Current River to northerly limits of city. By-law passed.

Refuge Bay, B.C.

Pile wharf. Tenders received by Sec. R. C. Desrochers, Ottawa, Dom. Govt. Dept. Public Works, until Oct. 24th. Plans and specifications at the office of G. B. Hull, dist. engr., Prince Rupert, B.C.; C. C. Worsfold, dist. engr., New Westminster; Postmaster, Refuge Bay; Dept. Ottawa, and MacLean Daily Reports, Toronto, Ont.

Rockwood, Ont.

Bridge. Engineer, H. R. Safford, Montreal, Que. The Board of Ry. Commrs. have the construction of a new G. T. R. bridge here.

Russell, Man.

Round house and freight yards are planned for Canadian Northern Railway Co., Winnipeg, Man. Chief Engineer, W. M. McLeod. Work will probably start shortly.

St. John, N.B.
Repairing Pettingill Wharf. Clerk, H. E. Wardroper. Commissioner, Harbor & Ferries, H. C. Schofield. Engineer, Wm. Murdock. Work authorized by City Council. Tenders to be called.

Sebringville, Ont.
Bridge planned for G. T. R. Engineer, H. R. Safford, Montreal, Que. The Board of Commissioners have authorized above work.

Seymour Arm, B.C.
Pile bent wharf. Tenders received by Sec. R. C. Desrochers, Ottawa, Dom. Govt. Dept. Public Works, until Oct. 29th. Plans, specifications at office of C. C. Worsfold, district engineer, New Westminster; F. W. Aylmer, district engineer, Chase B.C.; Postmaster, Seymour Arm, and MacLean Daily Reports, Toronto and Montreal.

Tp. York, Ont.
Bridge. The Board of Railway Commissioners have authorized the C. N. O. Ry. to construct bridge across Humber River, Tp. of York, County of York, 6.32 miles west from Toronto. Engineer, A. F. Stewart, Toronto.

Victoria, B.C.
The Board of Railway Commissioners have authorized the construction of spur for the Swith Canadian Co., Ltd. Esquimalt & Nanaimo Ry. Chief Engineer, H. J. Cambie, Victoria.

Vancouver, B.C.
Concrete beacon at False Creek, Vancouver Harbor. Tenders will be received until Oct. 25th. Plans, &c. at Dept. Marine & Fisheries, Ottawa and Victoria; post offices at Vancouver, New Westminster and Nanaimo. Address A. Johnston, Deputy Minister of Marine & Fisheries, Ottawa, Ont.

Westfield, N.B.
Wharf, Brundage's Point, for Dominion Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Site for wharf has been changed. Tenders to be called in about two weeks.

Winnipeg, Man.
Double tracking, Sargent avenue from Arlington to Wall street, for Winnipeg Electric Street Railway Co. The city council have recommended the work.

CONTRACTS AWARDED

Cedarville, Ont.
Bridge, cost $4,800, for Praton Twp. Engineer, I. Traynor, Dundalk. Reeve, Chas. Hockridge. General contractors, John & George Coutts, West Luther Signet P.

Coalmont, B.C.
Railway construction to cost $1,500,000 for Vancouver, Victoria & Eastern Ry. Co., Pender street, Vancouver. General contractors, Guthrie, McDougall & Co., Vancouver, 12 miles of road between Coalmont and Coquahalla Summit.

Ft. William, Ont.
Freight sheds to cost $30,000, Mission street, for Grand Trunk Pacific Railway. Architect and general contractor, Canadian Stewart Co., Ft. William. 1-sty., 50 x 300, frame and galvanized iron construction, galvanized iron roofing.

St. John, N.B.
Repairing wharves. Clerk, H. E. Wardroper. Commissioner of Harbor & Ferries, H. C. Schofield. Engineer, Wm. Murdock. General contractor, John A. Adams, 128 Queens W. E., St. John. For repairing D. A. R. wharf and wharf in front of No. 3 shed.

Public Building, Churches, Schools, etc.

Brantford, Ont.
Armoury 283 x 140, Brant avenue, for Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Site has been purchased and plans will be prepared.

Edson, Alta.
Hospital contemplated by the Town Council. Sec.-Treas., G. M. Phillips. Application has been made for a grant from the Lady Minto Fund toward the cost of a suitable building.

Ft. William, Ont.
Church to cost $5,000, McPherson, for Greek Orthodox Congregation, 534 McPherson street. 1-sty., 30 x 64, cement foundation, frame construction. Work to be done by day labor. Plans in progress.

Kamsack, Sask.
Town Hall to cost $20,000. Sec., John Bowles. By-law carried and plans will be prepared.

Montreal. Que.
Civic garage. Board of Control, Sec., L. N. Senecal, has recommended the erection of a fireproof garage to accommodate 75 automobiles.

Nokomis, Sask.
Rink to cost $5,000 is planned by town council. Mayor, A. H. Nichol. Sec., W. A. Armour. A by-law will be voted on Oct. 14th.

Ottawa, Ont.
Departmental buildings for Dominion Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. The architects of Canada and the Empire will be invited to submit plans for new dept. bldg. or buildings to be built on the bank of the Ottawa River west of the Parliament Buildings.

Paris, Ont.
Extension and alterations to Post Office and clock tower for Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Plans, specifications, etc., at office of Mr. Thos. Hastings, Clerk of Works, Postal Station F., Yonge street, Toronto. Post Office Paris, at Dept. Pub. Works, and at MacLean Daily Reports, Toronto and Montreal. Tenders received by Secretary until 4 p.m., Oct. 21st.

Port Arthur, Ont.
Heating and ventilating for school for Separate School Board. Tenders received by Architect, H. Russell Halton, Stanley Block.

Regina, Sask.
Building for St. Chad College. Architects, Brown & Vallance, Winnipeg. Local agent, L. J. Palmetier, 2057 Rose street. Plans being prepared.

Strathroy, Ont.
Curling rink for Strathroy Curling Club. President, W. P. Dymond. 65 x 156, interior woodwork, steel and cement work, seating required. Plans to be prepared.

St. Andrews, N.B.
Club House for The Algonquin Golf Club. Will build on ground recently purchased. Plans will be prepared.

Woodstock, N.B.
Memorial Library for Estate of L. P. Fisher. Executor, Alliston Connell. Architect, G. E. Fairweather, 34 Germain street, St. John, N.B. Stone and brick construction. Tenders have been received but it has been decided not to award contract until spring.

CONTRACTS AWARDED

Bowmanville, Ont.
Alterations to hospital to cost $8,000. Sec., John Lyle, Town Hall. Architect, Langley & Howland, Bay and Richmond streets, Toronto. General contractor, H. T. Hickey, 537 Reid street, Peterboro. 2½-sty., 40 x 48, stone foundation, brick construction.

Calgary, Alta.
Public Hall, cost $6,000, 14th ave. W. Architect and general contractor, M. McInnes, 1126 15th ave. One storey, 46 x 105, cement foundation, brick construction.

Church and parsonage to cost $30,000, Bridgeland, for Moravian Church Trustees, 408-7th avenue E. Pastor, Rev. Mr. Winegarth, 7th Ave. E. Architect, G. Leuchvitch, 233 4th avenue E. General contractor, R. Suter, 8th avenue E. 50 x 88, brick construction. Parsonage is brick veneered, 2-sty., 41 x 31.

Enderby, B.C.
School to cost $51,000. Architects, Bell & Constant, Vernon, B.C. Builder and general contractor, J. L. Ruttan. 2-sty., 110 x 78, cement foundation, brick and stone construction.

Gananoque, Ont.
Post office, cost $29,973. Dominion Government, Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. General contractor, E. A. Blakely. Heating and plumbing, W. F. Martin. Foundation in.

Lindsay, Ont.
Armoury for Dominion Government, Ottawa, Dept. of Public Works. Secretary, R. C. Desrochers. General contractor, Jas. Bogue, 220 Dublin street, Peterboro, Ont.

Medicine Hat, Alta.
School to cost $115,000. Architect, Wm. T. Williams. General contractor, Lussier Construction Co., Ltd. 2-sty., 136 ft. 2 in. x 71 ft. 10 in., brick, cement foundation.

Montreal, Que.
Addition to market to cost $10,000, Amherst street, for Board of Commissioners. Sec., L. N. Senecal. General contractors, Filion & Frere, 865 Huntly avenue.

North Battleford, Sask.
Hospital to cost $60,000, Arthur street, for Sisters of Providence, Montreal. Architect, Stephenson, Evans & Fillingham. General contractor, J. Holsworth. 3-sty., 100 x 45.

Newcastle, N.B.
Court house and office, cost $35,000, High and Prince William streets, for

County of Northumberland, N.B. Chairman of Committee, G. P. Burchill, South Nelson Sec.-treas., E. P. Williston. Architect, L. R. Fairn, Ayleford. General contractor, John McDonald, Chatham, N.B. and Henry Ingram, Newcastle. Two storeys, 72 x 50, stone construction

Port Colborne, Ont.
Addition to grain elevator to cost $201,000 for Dom. Govt. Dept. of Railways & Canals. Sec., L. K. Jones, Ottawa. General contractors, Dominion Bridge Co., Dom. Station, Montreal, Que. Capacity of elevator to be increased to 2,000,000 bushels.

Red Deer, Alta.
Church for St. Lukes Congregation. General contractor, Julius McIntosh. Foundations in.

Rosthern, Sask.
Church for The Mennonite Congregation. General contractors, Walker & Son. Foundation in.

St. John, N.B.
Theatre and stores to cost $135,000, South King Square, for Keith & Proctor, Boston, Mass. Architect, F. Neil Brodie, 42 Princess street. General contractor, H. 1. Brown, Philadelphia, Pa. Plastic ornamentation, Messrs. Tongeletti. 3-sty., 78 x 126.

Armory for Dom. Govt. Dept. of Public Works, Ottawa. Architect, H. H. Mott, 13 Germain street. General contractor, M. Sullivan, Kingston, Ont. Heating and plumbing, Elliott Bros., 77 Princess street, Kingston, Ont. 2-sty. & basement, 230 x 170, fireproof floors, electric light, hot water heating, interior fittings. 30 rooms besides drill hall.

Sherbrooke, Que.
Armory to cost $28,000, for Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractors, Loomis Dakin, Ltd. Structural steel, brick construction.

Toronto, Ont.
Veterinary College to cost $200,000, Universitl and Anderson Sts., for Ontario Govt. Dept. of Public Works. Sec., H. F. McNaughton, Parliament Bldgs. Masonry, Ed. Gearing Bros., 102 Carlton street. Carpentry, T. V. Gearing, 102 Carlton street. Iron and steel, Hamilton Bridge Co., Hamilton, Ont. Ptg., Jas. O'Hearn, 1249 Queen west.

Theatre to cost $12,000, for Mr. Robt. Vogan, 1032 Queen street west. Architects, Redmond & Beggs, Kent Bldg. General contractors, Orr Bros., 39 Queen street. 3-sty., 100 x 30, brick, tile, reinforced concrete, steel construction.

Transcona, Man.
School. Architect, E. D. Tottle, 707 McArthur Bldg., Winnipeg. General contractors, Haney, Quinlan & Robertson, Transcona. Heating and plumbing, Cotter Bros. Elec. work, R. Andrews, Transcona.

Vernon, B.C.
Court house to cost $200,000 for Provincial Government, Dept. of Public Works, Victoria, B.C. Public Works Engineer, J. E. Griffith. General contractors, John Burner & Sons, Vernon and Nelson, B.C. Heating and plumbing, J. E. Ross, Seymour avenue, Vernon. 2-sty., brick, tile and kanyon granite construction, stone and cement foundation.

Winnipeg, Man.
Interior fittings for hospital. Secretary, M. Peterson. Architect, Herbert B. Rugh, 928 Union Bank Bldg. Engineer, H. N. Ruttan, 223 James avenue. Contract awarded to Otis Fensom Elevator Co. for elevator system in King George Isolation Hospital at $8,000.

Business Buildings and Industrial Plants

Brantford, Ont.
Addition to factory for The Pratt & Letchworth Co. Ltd. (Malleable Iron Works) Wilkins street. Manager, J. E. Hammond. Plans to be prepared.

Chatham, Ont.
Warehouse to cost $12,000, Queen St., for The American Pad & Textile Co. Architects, J. L. Wilson & Sons. 2-sty. and basement, 50 x 150, concrete foundation, brick, structural steel and iron construction. Plans in progress.

Edmonton, Alta.
Office building for Western Trust Co., 274 Main street, Winnipeg. Interested, A. J. Adamson, c/o company. Plans in progress. Will build next spring.

Office building to cost $500,000, for K. A. MacLeod. 10-sty., 110 x 118, steel frame construction, terra cotta facings, pressed brick trimmings, 3 high speed elevators required. Architect Jno. K. Dow, Spokane, Wash., has opened office in Edmonton to supervise work. Plans to be prepared.

Fairville, N.B.
Factory, Beach street, for F. R. Dearborn, Water street, St. John. 4-sty., 450 x 75. A site has been secured but work on building will not commence until next spring.

Fort William, Ont.
Oil plant to cost $7,000, C.P.R. property, for Pintoch Compressor Co., New York, N. Y. Representative, Mr. Pearson, c/o Pintoch Compressor Co., Avenue Hotel, Ft. William. Tenders received by Mr. Pearson. 2-sty., 28 x 34, cement foundation, brick construction.

Gananoque, Ont.
Alterations to factory. N. A. Booth, Brooklyn, N.Y., has purchased old Gibson factory; will remodel and enlarge with intension of establishing fine felt manufacturing concern.

Hamilton, Ont.
Additions to cost $10,000 for J. Blake, proprietor Arlington Hotel, 65 King William St. Remodelling and adding 33 rooms, new interior fittings required. Plans in progress.

Extension to brass factory for The Tallman Brass & Metal Co., Sanford and Wilson streets. Plans in progress to double plant next spring.

Lacombe, Alta.
Business block for Frank McLear. 60 x 50, brick and steam construction. Plans in progress.

Lindsay, Ont.
Auto factory to cost $12,000, Wellington street, for J. A. Fitzsimmons. 2-sty., 126 x 43 ft. 6 in., stone foundation, concrete construction. Machinery required for manufacturing auto bodies built out of aluminium. Tenders received by owner for heating system and large brick chimney.

Macleod, Alta.
Office building, 3rd avenue and 24th street, for R. G. MacDonnell and Hon. Malcolm MacKenzie. 4 storeys. Plans in progress.

North Battleford, Sask.
Hotel to cost $35,000, King street, for McCann Bros. Architects, Stephenson, Evans & Fillingham. 3-sty., 90 x 60, brick veneer construction. Plans prepared.

Queensborough, B.C.
Factory to cost $23,000, Lulu Island, for The New Westminster Woodworking Co., New Westminster, B.C. Manager, James Brooks. Plans in progress. Steam plant to be installed.

St. John, N. B.
Foundry, Courtney Bay, for Drummond Iron Mines, Middleton, N.S. Chief Engineer, W. F. C. Parsons, c/o above company. Proposed to have 2 blast furnaces of 250 tons daily capacity each, also rolling mill and bar steel works. Plans to be prepared.

Toronto, Ont.
Stables to cost $5,000, 96 Alcorn Ave., for J. A. Simmers Ltd., King street E. Architect, Chas. Wagner, 15 Toronto St. 68 x 78, brick foundation, brick and galvanized iron construction. Plans drawn.

2 stores to cost $8,000 for W. W. Hiltz, 682 Broadview avenue. Architect, P. H. Finney, 79 Adelaide street east. 3-sty., 41 x 70, brick, stone foundation. Tenders called.

Vancouver, B.C.
Departmental store, Georgia and Granville, for the Hudson's Bay Co. Architects, Burke, Horwood & White, 28 Toronto street, Toronto, Ont. Plans, specifications, etc., at office of architects. Owner's offices at Winnipeg, Vancouver and at Clerk of Works' office at H. B. Co.'s new building at Calgary. Tenders received for all trades except plumbing, heating, wiring and general mechanical equipment, by architects, until October 24th.

Bank building, Commercial Drive and Graveley street, for Royal Bank of Canada, 400 Hastings W. Bank has purchased site 50 x 89 and plans will be prepared.

Store and office building to cost $65,000, Main street, for A. E. Suckling & Co., foot Jackson street. Tenders received by architects Braunton & Leibert, 81 Exchange Bldg. 6-sty., 25 x 120, reinforced concrete construction, terra cotta and marble.

Virden, Man.
Store and bakery to cost $4,000, 7th avenue, for James Lane. Architect, Wm. T. Master. 2-sty., 25 x 60, stone foundation, white brick construction. Plans in progress.

Winnipeg, Man.
Tannery planned for the Raw Hide Leather Goods Co. Manager, T. E. Woodcock, P. O. Box 1805. To be erected on Winnipeg ave., between Flint street and C. P. R. tracks.

CONTRACTS AWARDED

Amherst, N.S.
Auto factory to cost $70,000, for Nova Scotia Carriage Motor Car Co. Gen-

ral contractors, Rhodes Curry Co. Ltd. Reinforced concrete construction.

Calgary, Alta.

Stores, cost $8,000, Tuxedo Park, for Canadian States, Ltd., Herald Block. Builders, Wakefield & Kenny, 306 MacLean Block. Two storeys, 54 x 56, cement foundation, frame construction.

Stores to cost $12,000, 1st street west, for Southams Ltd., Hamilton. General contractors, Fysche Martin Co., Dominion Bank Bldg. 1-sty., 41 ft. 6 in. x 100, brick, cement foundation.

Store to cost $4,000, for Florence Tour c/o P. A. McDonald, Ogden P. O. Builder, Bert Liber, Ogden P.O. 2-sty., 25 x 40, cement foundation, frame construction.

Alteration to warehouse to cost $4,000, 10th avenue E., for John Deer Plow Co., 10th avenue E. Architects, Burroughs & Richards, Crown Blk. General contractor, Hofins & Street Bros., 321 Travis Block.

Coldbrook, N.B.

Auto factory to cost $250,000, for The Maritime Motor Car Co. Director, J. A. Pugsley, Canterbury street, St. John. Architect, F. Neil Brodie, 42 Princess St., St. John. General contractors, A. R. C. Clark & Son, 51 Water street, St. John. Engineer in charge, G. C. Murdock, Water Works Bldg., Carmarthen street, St. John. Heating and ventilating, Buffalo Forge Co., 17 Bleury St. Montreal, Que. 3 buildings, 1-sty.

Ft. William, Ont.

Warehouse to cost $15,000, Hardisty street, for North Shore Supply Co. Architects and general contractors, Russell Bros. 2-sty., 50 x 70, cement foundation, common brick construction.

Wire fence factory, Island No. 2, for Thomas Black, 76 Lombard street, Winnipeg, Man. Architect and general contractor, G. H. Archibald & Co., 827 Union Block, Winnipeg, Man. 1-sty., 125 x 200, cement foundation, reinforced concrete or brick construction.

Stores and apartments to cost $20,000, May street, for J. Smith Architects and general contractors, Russell Bros. 3-sty., 25 x 75, cement foundation, pressed brick construction.

Gananoque, Ont.

Extension to rolling mill plant for D. F. Jones Mfg. Co. General contractors, Byers & Anglin, 65 Victoria street, Montreal. Asbestos roofing, Henry Bedard, Brockville.

Montreal, Que.

Store and residence to cost $5,000, Alice street, for S. Gagne, 1901 Hotel de Ville. Builder, Virginie Boyer. 2-sty., 50 x 32, stone foundation, brick veneer construction. Foundation in.

Store and residence to cost $4,200. Owner and builder, Albert Ouimet, 3036 St. Lawrence. 3-sty., 23 x 45, cement foundation, brick veneer construction. Excavation started.

Offices, cost $9,600, 355 St. Catherine street, for Berliner Gramaphone Co., Lenoir and St. Antoine. Architects, MacVicar & Heriot, 104 Union ave. Mason, A. M. Ross & Co., 1360 St. Urbain. Carpenter, M. Fromson, 68 Colonial. Iron and steel, F. A. McKay, 18 St. George. Plastering, R. Geo. Hamilton, 515 Victoria ave. Painting, E. Graoss, 98 Inspector. Heating and plumbing, W. J. Graham, 85 Cathcart. Electrical work, Electrical Repair & Construction Company, 119 Lagauchetiere W. Marble & tile, Smith Marble & Construction, 145 Van Horne street. Ventilating, Buffalo Forge Co., 17 Bleury.

Stores, cost $18,000, Pine ave., for M. Lavutt & Son, 564 St. Lawrence Blvd., general contractors. Architect, Chas. Chausse, 17 Place d'Armes Hill. Three storeys, 39 x 106, brick, cement foundation. Plans drawn.

Shoe factory to cost $31,000, 475 Ontario street, for N. Gagnon, 585 St. Timothee. Architect, L. R. Mont Briant, 230 St. Andrie. General contractor, G. Cote, 2031 Boyer. 4-sty. and basement, 80 x 120, brick construction.

Foundry to cost $4,200, for The Lafrance Imp. Pipe Joint Co. Ltd., 1165 Carrieres. 1-sty., 55 x 125, concrete blocks, cement foundation. General contractor, Jos. Lafrance, c/o owner.

Moose Jaw, Sask.

Four stores for Security Land Company, Ltd., Bank of Hamilton Chambers, Winnipeg. General contractors, National Construction Co., Donalda Block, Winnipeg. One storey, brick construction.

Regina, Sask.

Warehouse to cost $30,000, 6th and Osler, for Goold Shapley & Muir Co., Clarence and Wellington streets, Brantford. Sec.-treas., W. H. Whittaker. General contractor, Fred Lewis, 603 McIntyre Bldg., Winnipeg. 2-sty., 113 x 73, brick construction.

Office building to cost $50,000, Hamilton street, for E. A. McCallum. Architects, Storey & Van Egmond. General contractors, McKay Construction Co. Red pressed brick, Tyndall stone and steel construction. Foundation in

St. John, N.B.

Store to cost $15,000, Charlotte street, for Estate of Henry Coffee, Rothsay, N. B. Architect, Garnet Wilson, Princess street. General contractor, R. A. Corbett, Douglas avenue. Ptg., Milton W. Galley, 276 Union street. Plumbing, G. & E. Blake, Germain street. Electric work not let. 3-sty., 25 x 70.

Toronto, Ont.

Storage warehouse, Adelaide street, for City Council. Mayor, G. R. Geary, City Hall. Architect, City architect. General contractors, Wm. Forbes & Son, 65 Lee avenue. Stone foundation, brick construction.

Factory to cost $5,000, for Ewing & Murphy, rear of 48 Cameran street. Builder, Walter Nash, 79 Gorevale Ave. 2-sty., brick and mill construction, cement foundation.

Stores and residence to cost $10,000, Dundas street. Owner and builder, T. J. Bowen & Co., 814 Dundas street. Architects, Redmond & Beggs, Kent Bldg. 2-sty., stone foundation, brick construction. Plans drawn.

Warehouse to cost $5,000, 904 Don Esplanade. Architect and builder, E. L. McColl, 289 Carlton street. Galvanized iron construction, cement foundation. Plan drawn.

Vancouver, B.C.

Store and office building to cost $50,000, 635 Granville street, for Richards, Akroyd & Gall, 325 Homer street. Architect, S. B. Bird, Duncan Bldg. General contractor, C. L. Williams, 319 Pender street. 4-sty., 25 x 120, brick, mill construction, terra cotta front.

Addition to hotel to cost $20,000, 605 Dunsmuir, for Leon Melekov, 1145 Burnaby. Architect, W. T. Whiteway, c/o owner. General contractor, E. J. Ryan, 768 Granville street.

Victoria, B.C.

Office building to cost $11,000, Langley and Yates, for Bankers' Trust Corporation Ltd., Victoria and Vancouver. Architect, L. W. Hargreaves, 425 Sayward Block. General contractor, Pacific Coast Construction Co., Yates St. Brick and concrete construction.

Winnipeg, Man.

Office building to cost $150,000, Notre Dame E., for Notre Dame Investment Co., Keewayden Bldg. Architect, G. W. Nortwood, 232 Portage avenue. General contractors, J. McDiarmid Co., Canada Bldg. 8-storeys, brick and steel, fireproof construction.

Office building, Notre Dame, Garry & Ellice streets, for Frank Lindsay, c/o Oxford Hotel. Architects, Woodman & Carey, Free Press Bldg. General contractor, National Construction Co., Donalda Block. 7 storeys.

Stores and offices, Main street and Graham avenue, for Can. Dom. Development Co. Ltd. Address Jno. A. Patterson, 284 Vertage avenue. Architect, Jno. D. Atchison, Loan & Trust Bldg. 2-sty., brick construction. Excavation started

Creamery to cost $250,000, Burnell St. for The Crescent Creamery Co. Ltd. Pres., R. A. Rogers. Architect, Jordon & Oner, Can. Lift Bldg. General contractors, Wallace & Aikens, 283 Donald street. Steel work, Concrete & Steel Products Co., Chicago, Ill. Refrigerating machinery, Larsen Ice Machine Co., Chicago. 280 x 80, concrete foundation and fils, reinforced concrete construction, lighting, heating and plumbing contracts separate.

Residences

Beaurepaire, Que.

Residence to cost $150,000 for Sir H. Montagu Allan, McTavish street, Montreal. Architects, Hogle & Davis, 80 St. Francois Xavier street, Montreal. Brick and stone construction, all modern conveniences. Plans being prepared.

Dawn Valley, Ont.

Residence to cost $1,500, for J. H. Curtis. 1½-sty., brick, shingle roofing. Plans will be prepared.

London, Ont.

Residence, Dufferin street, for J. M. Moore, 478 Waterloo street. Brick and stone construction, all modern conveniences. Plans to be prepared.

North Battleford, Sask.

Apartments to cost $25,000, George street, for Martin Lemweler. Architects, Lachance & Favoil. 3-sty., 100 x 40, stone and brick foundation, brick construction. Plans prepared.

Sherbrooke, Que.

Residence to cost $1,500, Rue street, for Chas. L. Heureux. 3-sty., 50 x 35, brick veneer construction, stone foundation. Foundation in. Work being done by day labor by owner.

St. John, N.B.

Apartment house to cost $150,000, Canterbury, for Allison & Thomas, Prince

William street representing company. Architect, Jas. E. Adamson, 127 Stanley street, Montreal. 4-sty. and basement, 110 x 90, concrete foundation, brick and stone construction, buff stone trimmings. Plans prepared

Toronto, Ont.

1 pair dwellings, Edwin avenue, for Davis & Moore, 176 St. Clarens Ave. 2-sty., 32 x 42, brick, stone foundation. Plans drawn.

One pair res., St. Andrews Gardens, for Rea, Lynch & Co., Janes Bldg. Architects, Designing & Draughting, 36 Toronto street. Brick foundation and construction. Plans drawn.

Residence to cost $8,000, Indian road, for W. C. Cliff, 212 Grace street. Architects, Curry & Sparling, 90 Yonge St. Stone foundation, brick construction. Plans drawn.

Residence to cost $7,000, Spadina road, for W. J. Slanker, 309 Avenue road. Architect, Wm. Berry, 1107 College street. 2½-sty., brick foundation and construction. Plans drawn.

Residence to cost $11,000, Drumsnab road, for Mrs. Wm. Davies. Architects, Langley & Howland, Continental Life Bldg. 2½-sty., brick foundation, brick cut stone and tile construction. Tenders received by architect.

Residence to cost $6,000, Spadina Rd., for J. A. Ross, 249 Bedford road. Architect, Langley & Howland, Continental Life Bldg. 2½-sty., brick construction and foundation, gas and electric lighting.

2 residences and garage to cost $6,000, Hutchison avenue, for Ida E. A. M. Hill, 7 Fairview Blvd. 2-sty., 34 x 24, brick construction, brick foundation. Plans drawn.

1 pair dwellings to cost $5,000, for F. Burrows, Jr., 448 Ontario street. Architects, Redmond & Beggs, Kent Bldg. 2½-sty., brick and stone foundation. Plans drawn.

Residence to cost $3,500, for Volk & Gee, 123 Emerson avenue. Architect, J. Gladwin Hedges, 210 Clinton street. 2-sty., 25 x 40, brick construction, stone foundation. Tenders received by owner.

Residence to cost $7,000, High Park Blvd., for Frank Babcock, 294 Indian road. Architect, D. E. Smith, 77 Victoria street. 2½-sty., brick construction, stone foundation, concrete tile. Tenders called.

Apartment house to cost $18,000, Palmerston avenue, for M. Donohue, 151 Palmerston avenue. Architects, Mallory & Thatcher, 31 Queen street west. 3-sty., 70 x 50, stone foundation, brick construction. Tenders called.

2 detached dwellings to cost $10,000, St. Johns road. Architect and builder, Berger & Gold, 511 Quebec avenue. 2½-sty., brick, brick foundation. Plans drawn.

Vancouver, B.C.

Apartment house to cost $80,000, 658 Hastings E., for S. J. Lund, 201 Empire Bldg. Architect, F. H. Perkins, Hutchinson Bldg. 5-sty., mill construction. Plans ready.

Winnipeg, Man.

Residence. The West End Realty & Building Co., Lenore & Portage avenue, Pres., N. Herschenson, c/o company, propose to erect about 100 residences in Edmonton, Alta.; also some in Regina, Sask. Building operations to start next spring.

Windsor, Ont.

Apartment house to cost $4,500, for Mrs. James Forbes, London street. Plans in progress.

CONTRACTS AWARDED

Beaumaris, Lake Muskoka, Ont.

Summer residence to cost $10,000, for W. Mellon, Pittsburg, Pa. General contractor, J. J. Knight, Bala, Ont. Stone construction, metallic roofing. Wharf and launch house also to be built.

Chatham, Ont.

Residence to cost $5,000, Patterson St., for Mr. Huxley Marshall. Architect, J. L. Wilson & Son. General contractors, carpenter, roofing, and interior fittings, Thos. Rayment, 10 Forest street. Mason, Leo Wardle. Ptg., John Crow, 33 Gray street. Heating, plumbing and electric, C. R. Bowers, 6 Lacroix Slip. 2-sty. and basement, 23 x 29, cement foundation, frame and brick veneer construction.

Calgary, Alta.

Residence to cost $4,000, Rideau Park, for M. Rutledge, 327 21st avenue west. Builders and general contractors, Building & Loans Ltd., 32 Cadogan Blk. 2-sty., 24 x 29, cement foundation, frame construction.

Nineteen residences, cost $34,000, Altadove, for Archer & Robertson, Dominion Bank Bldg. Builder, W. L. McLam, 1727 33rd ave. south. One and two storeys, 20 x 32, cement foundation, frame construction.

Residence, cost $4,000, Hillhurst, for W. Aikelyn, 1417 2nd ave. N.W. Builder and general contractor, J. R. Dipner, 237 11th street N.W. Two storeys, 20 x 36, cement foundation, brick construction.

3 residences to cost $10,000, Rosedale. Architect and general contractor, J. A. Knoepfli, 504 MacLean Blk. 2-sty., 26 x 36, cement foundation, frame construction.

Residence to cost $5,000, Elbow Park, for H. F. McKinnon. Builders and general contractors, Bennett & Duncan, 2411 Cedar avenue. 2-sty., 38 x 30, frame, cement foundation.

Residence to cost $5,400, South Mount Royal, for F. A. McNaughten. Builder and general contractor, Bennett & Duncan, 2411 Cedar avenue. 2-sty., 28 x 43, frame, cement foundation. Excavation under way.

Residence to cost $5,000, Balmoral. Architect and general contractor, D. G. Brison, Box 1474. 1-sty., 20 x 36, cement foundotion, frame construction. Excavation started.

Residence to cost $4,500, Crescent Heights. Owner and builder, N. J. Duckworth, 611 MacLean Block. 2-sty., 25 ft. 6 in. x 45 ft., cement foundation, brick construction.

Residence to cost $4,000, for A. G. Lecor. Builders and general contractors, Stones & Son, 1511 14th avenue. 2-sty., 24 x 26, cement foundation, frame construction.

Residence to cost $6,000, 14th avenue west. Builder and general contractor, McInnes Bros., 1126 15th avenue west. 2-sty., 46 x 69, cement foundation, frame construction.

Residence to cost $4,000, Westmount. Builder and general contractor, E. R. Leverton, 407 Lougheed Blk. 2-sty., 19 ft. 6 in. x 32 ft., cement foundation, frame construction.

2 residences to cost $5,000, Sunnyside. Builder and general contractor, G. W. Rae, 1119 5th avenue west. 2-sty., 18 x 32, cement foundation, frame construction. Excavation started.

Two res., to cost $6,000, Mt. Pleasant, for W. Motherwell, 507 10th St. W. Builder and general contractor, J. Taylor, 113 11th avenue E. 2-sty., 22 x 30, cement foundation, frame construction.

Residence to cost $5,000, for A. E. Anderson. Builder, E. R. Fullerton, 8 Wright Block. 2-sty., 26 x 36, cement foundation, brick construction.

Residence to cost $4,000, Missim, for W. Thurlow, 521 22nd avenue W. Builder and general contractor, Lea & Goulding, 703 Sifton Blvd. 2-sty., 19 x 34, cement foundation, frame construction.

Hamilton, Ont.

Residence to cost $9,000, Herkimer street, for W. R. Dunn, 115 George St. Architect, J. D. Conigan, 231 Catherine street. General contractor and carpenter, J. Poag & Co., Westinghouse Ave. Mason, R. Isbister, 125 Wellington St. 2½-sty., 29 x 38, stone foundation, pressed brick construction.

Medicine Hat, Alta.

Residence, El Paso, for F. C. Wolf. Architect, A. Trimble. General contractor, Geo. Dixon. 1-sty., 29 x 38, frame, brick foundation.

Residence to cost $12,000, Lockwood, for W. Rutherford. Architect, Wm. T. Williams. General contractors, Sackrider & Turner. 2-sty., 36 ft. 6 in. x 51, brick and cement.

Residence to cost $4,500, 2nd avenue and Altawana, for Capt. Parker. Architect, Wm. T. Williams. General contractors, Oaks & Everhard. 1-sty., 38 x 42, frame, cement foundation.

Montreal, Que.

Residence to cost $4,200. Owner and builder, J. B. Barbeau, 99 Church avenue. 3-sty., 25 x 31, brick, stone foundation. Foundation started.

6 cottages to cost $25,000, Northcliffe. Owner and builder, Fred Demers, 2380 Clark. 2-sty., 25 x 38 each, brick, cement foundation. Foundation in.

Residence, cost $6,000, Briand, for Dame S. Ladouceur, 27 Devilliers. Architect, Rene Charbonneau, 15 St. James. General contractor, Alfred Larocque. 3 storeys, 17 x 52, cement foundation, brick veneer construction.

Flats to cost $7,200, De Levis. Owner and builder, S. Christin, 185 Poupart. 3-sty., 44 x 42, cement foundation, brick construction. Foundations started.

Residence to cost $20,000, 5th avenue, for R. C. School Commissioners, la cote Visitation. Architect, Dalbie Viau, 76 St. Gabriel. General contractor, Ulric Boileau, 474 Gilford. 3-sty., 65 x 35, cement foundation, brick construction.

Residence to cost $6,000, 116 Montana, for Eugene Charbonneau, 723 St. Andre. Architect, C. Bernier, 80 St. James St. General contractors, Guertin & Bouchard, 414 Parthenais. Brick veneer construction.

Residence to cost $4,800, Christophe Colomb. Owner and builder, Joseph

Ferland, 463 Montana. 3-sty., 25 x 40, cement foundation, brick construction. Foundation in.

Residence to cost $6,000. Chateaubriand, for Lewis Garnier, 958 Dorion. Builder, H. Gousset, 2607 Chateaubriand. 2-sty., cement foundation, brick construction.

Residence to cost $4,800, Dandurand. Owner and builder, Edmond Gagnon, 499-3rd avenue. 3-sty., 30 x 43, cement foundation, brick construction. Foundation in.

Residence to cost $5,200, Esplanade. Owner and builder, Pierre Beaumont, 2470 Esplanade, 3-sty., 25 x 52, stone foundation, pressed brick construction.

Residence to cost $4,800, Bordeaux, for Delle Scholastique Meunier, 1913 Bordeaux. Architect, J. E. Drouin, 1915 Bordeaux. 3-sty., 25 x 53, stone foundation, pressed brick construction. Excavation started.

Residence to cost $6,000, Old Orchard. Owner and builder, Beaudoin, Gagnon & Bergeron, 1845 Notre Dame. 3-sty., 25 x 40, cement foundation, pressed brick construction. Excavating under way.

4 residences to cost $21,600, Grey Ave. Owner and builder, Chas. J. Brown, 4263 St. Catherine. 2-sty., 23 x 43 each, brick, cement foundation. Excavation started.

2 residences to cost $9,600, 442 Drisonne. Owner and builder, Reginair Rheault, 2218 Ontario. 3-sty., 50 x 45, pressed brick, cement foundation. Excavating started.

Outremont, Que.

2 cottages to cost $16,000, De L'Tpee. Owner and builder, C. Desjardins, 353 Rachel E. 2-sty., 50 x 40, brick and stone construction, cement foundation. Plans ready.

Penny's Point, Lake Rosseau, Ont.

Residence to cost $5,000 for Mrs. Christopher Robinson, 266 Richmond St. W., Toronto, Ont. Genera clontractors, Rogers Bros., Port Sandfield, Ont.

Regina, Sask.

Apartment house, cost $30,000, Robinson and 14th ave., for Modern Apartments Co., Ltd. Architect and general contractor, G. F. Ward. Three storeys, 100 x 57, solid brick construction. Excavation started.

St. Andrews, N.B.

Residence to cost $8,000, for Mr. Hayter Reed, C. P. R. Hotel Supt. General contractor, Harry Russell. Site has been purchased beside Algonquin Hotel.

St. Thomas, Ont.

Residence to cost $4,000, for Mr. Nelson, jeweller. Architect, J. T. Finlay General contractor, Albert Morriss. 2-sty., 26 x 38, concrete foundation, brick veneer construction.

Toronto, Ont.

Residence, cost $8,000, High Park Blvd., for National Trust Co., King St. Architects, Designing & Draughting Co., 36 Toronto street. Builders, Hill & Strathy, 123 Simcoe street. 2½ storeys, brick and cut stone construction, stone foundation.

Three residences, cost $5,400, Barber ave. Owner and builder, Chas. H. Bentley, West Toronto P.O. Stone foundation, brick construction.

1 pair dwellings to cost $5,600, 13-15 Rusholme Park Cres. Architect and builder, W. F. McCutcheon, 1042 Dovercourt road. 3-sty., brick, stone foundation. Plons drawn.

Residences, Bertmount avenue. Owner and builder, Edward Smith, 92 Barton avenue. 2-sty., stone foundation, brick construction. Plans drawn.

Residence to cost $5,000, 11 Fairview Blvd. Owner and builder, S. J. McClelland, 29 Fairview Blvd. 2½-sty., brick foundation and construction. Plans drawn.

Dwelling to cost $4,500, Bloor street W. Owner and builder, John Ewing, 708 Dufferin street. 2½-sty., brick, stone foundation. Plans drawn.

1 pair residences, Gilmore avenue. Architect and builder, Wm. Summers, 17 Kenneth avenue. 2½-sty., 30 x 40, brick and stone. Plans drawn.

2 residences to cost $5,600 for Alfred H. Cox, 142 Balsam avenue. Builder, F. J. Cummings, 150 Balsam avenue. 2½-sty., brick foundation and construction.

1 pair dwellings to cost $9,000, Bablock avenue. Owner and builder, G. W. Johnston, 598 Crawford street. 2-sty., 30 x 42 each, brick, stone foundation. Plans drawn.

Residence, Alvin avenue, for Alfred Charlton, 37 Foxbar road. Builder, Wm. Brown, 122 Garnet avenue. 2-sty. and attic, brick, stone foundation.

1 pair residences to cost $5,500, Hilton avenue. Owner and builder, H. F. Saunders, 35 Geoffrey street. 2-sty. and attic, 34 x 50, brick. Plans drawn.

2 residences to cost $6,500, Oakmount avenue. Owner and builder, D. A. Cantalon, 101 Fermanagh. Stone foundation, brick construction. Plans drawn.

Residence to cost $6,800, Sparkhall & Broadview, for Rev. J. P. Scott, 706 Spadina avenue. Builder, Thos. Brick, 716 Broadview avenue. 8½-sty., brick foundation, cut stone and brick construction.

Residence and stable to cost $5,000, Royce avenue. Owner and builder, Henry Grambloth, 7 Fisken avenue. 2-sty., stone foundation, brick construction. Plans drawn

Vancouver, B.C.

Apartment house to cost $19,000, 700 Blk. Powell street, for Mrs Mabel Langley. Architect, J. Dawson, Holden Bldg. General contractors, Pinner & McLellan, 629 Cambie street. 3-sty., brick and mill construction General contractors will receive tenders for excavating, plumbing, heating, plastering, ptg., electric work, roofing, ornamental iron and structural steel, lumber, mill and sheet steel work

Residence to cost $5,000, 3005 10th avenue W., for E. S Plum Architect, W. P White, 129 Pender street W General contractor, T A Allen, 510 Pender street 2-sty., frame construction.

Winnipeg, Man.

2 residences to cost $8,000, Ethelbert Owners and general contractors, Walley & Saul, 811 Somerset Bldg Architect F. W. Crayston, 572 Ross avenue 2-sty., 26 x 30, 28 x 32, frame construction

Residence to cost $6,000, Rosser Ave Architect and general contractor, J. McHattie, 846 Main street 2-sty., 22 x 36, stone foundation frame construction

Power Plants, Electricity and Telephones

Edson, Alta.

Telephone system, Provincial Government, Dept. of Railways and Telephones. Deputy Minister, W. J. Harmer, Edmonton. G. M. Phillips, Sec.-treas. of Edson has been in consultation with Mr. Harmer regarding the proposed installation.

Kingston, Ont.

Addition to power house, Queen St Engineer, R. J. McClelland. Excavating, McCartney & Payne. Carpenter, W. J. Chapman, 322 Queen street. Ptg. and glazing, T. McMahon & Co., 133 Brock street. Plmbg., heating and roofing, Simmons Bros., 211 Princess street. Brick construction.

London, Ont.

Extension to telephone system in Victoria Hospital. Chairman, Col. W. N. Gartshore. Architect, McBride & Farncomb, Bank of Toronto Chambers. Supt., T. H. Heard. Work planned to shart shortly.

Orillia, Ont.

Telephone exchange to cost $15,000. Peter street, for Bell Telephone Co. Ltd Architects and builders, E. Webb & Son. Local manager, H. M. Black. 2-sty., 50 x 110, cement-finish, reinforced concrete and pressed brick construction.

Rapid City, Man.

Electric light system proposed. Mayor, J. R. Burland. Clerk, C. G. Murray. By-law to be voted on soon.

St. John, N.B.

Extension power plant and installation of additional plant to cost $50,000 Smythe street, for St. John Street Ry. Co. Sec.-treas., H. M. Hopper, Dock street. Plans in progress.

Vancouver, B.C.

Ornamental street lighting standards. Clerk, Wm. McQueen. City electrician, W. T. Woodroffe. Tenders received by council until Oct. 17th for installation of light standards on Main, Granville, Harris and Hastings streets. Specifications at office of electrician.

Winnipeg, Man.

Transformers, turbines and alternators, cost $250,000. Secretary, M. Peterson. Engineer, J. G. Glassco, 54 King street. Light & Power Dept. will require transformers this fall as follows: one 9,000 kw. and three 3,000 kw. 3-phase, water-cooled transformers with necessary high tension switch gear for the generating station, estimate cost $100,000; also for 1913, two extra units consisting of turbine and alternators, estimated cost $150,000.

Electric lamps. Sec., M. Peterson Engineer, J G Glassco, 54 King street A supply to sell to private people for domestic use Specifications at office of engineer Tenders received by secretary until Oct 10th

Underground telephone ducts, Salter street, for The Manitoba Govt. Telephone Commissioners. The City Council has decided to allow above work to be done

Arc lamps, etc., to cost $7,600 Sec., M Peterson Engineer, J. G Glassco, 54 King street General contractor, Canadian Electric Co. 100 luminous arc lamps at $58 each; 100 cut outs at $7.50 each, 1,000 electrodes for $1,000; globes at $10 a dozen

Tenders and For Sale Department

City of New Westminster, B. C.

The Corporation invites tenders for the supply of about 1,600 feet of 48-inch steel pipe, bends and specials, for outfall and syphon of Section No. 2 of Sapperton System.

Further information, specifications and plans may be obtained from J. W. B. Blackman, M. Can. Soc. C.E., City Engineer, and plans, etc., may be seen at the offices of the Contract Record and Canadian Engineer, Toronto.

Tenders are to be delivered to the undersigned, accompanied by a marked cheque of 5 per cent. on the amount of the tender, on or before October 24th, 1912.

The lowest or any tender not necessarily accepted.

Plans and specifications can be obtained by depositing $25 with City Treasurer.

(Signed) W. A. DUNCAN,
City Clerk.
41-42-50

City of New Westminster, B. C.

The Corporation invites tenders for the supply of about 10,400 feet of reinforced concrete pipe of the lock or continuous jointed type, in sizes from 20 to 54 inches, for districts A. B. and Outfall of Section No. 2 of Sapperton System.

Further information, specifications and plans may be obtained from J. W. B. Blackman, M. Can. Soc. C.E., City Engineer, and plans, etc.. may be seen at the offices of the Contract Record, and the Canadian Engineer, Toronto.

Tenders are to be delivered to the undersigned, accompanied by a marked cheque of 5 per cent. of the amount of the tender on or before October 24th, 1912.

The lowest or any tender not necessarily accepted.

Plans and specifications can be obtained by depositing $25 with City Treasurer.

(Signed) W. A. DUNCAN,
City Clerk.
41-42-49

Sealed tenders, addressed to the undersigned, and endorsed "Tender for Addition and Alteration to Public Building, Paris, Ont.," will be received at this office until 4 p.m. on **Monday, October 21, 1912**, for the work mentioned.

Plans, specifications and form of contract can be seen and forms of tender obtained at the office of Mr. Thos. Hastings, Clerk of Works, Postal Station F., Yonge street, Toronto, at the Post Office, Paris, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, September 28, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.
41

City of New Westminster, B. C.

The Corporation invites tenders for the construction of about 7¾ miles of combined sewers for districts A, B, and Outfall in Section No. 2 of Sapperton System. Laying Reinforced Concrete Pipe, 20 to 4 inches diameter, or construction of Monolithic Reinforced Concrete Sewers, providing and laying Vitrified Pipes up to 18 inches diameter. Twin 48-inch syphon and outfall.

Further information, specifications and plans may be obtained from J. W. B. Blackman, M. Can. Soc. C.E., City Engineer, and plans, etc., may be seen at the offices of the Contract Record and Canadian Engineer, Toronto.

Tenders are to be delivered to the undersigned, accompanied by a marked cheque of 5 per cent. on the amount of the tender on or before October 24th, 1912.

The lowest or any tender not necessarily accepted.

Plans and specifications can be obtained by depositing $25 with City Treasurer.

(Signed) W. A. DUNCAN,
City Clerk.
41-42-48

Mail Contract

Sealed tenders, addressed to the Postmaster General, will be received at Ottawa until noon on **Friday, the 15th of November, 1912**, for the conveyance of His Majesty's Mails on a proposed Contract for four years, six round trips per week, on Rural Mail Route from King, Ontario, to commence at the pleasure of the Postmaster General.

Printed notices containing further information as to conditions of proposed Contract may be seen and blank forms of Tender may be obtained at the Post Offices of King, Davis Corners, Eversley, Temperanceville and at the office of the Post Office Inspector at Toronto.

G. C. ANDERSON, Superintendent.
Post Office Department,
Mail Service Branch,
Ottawa, Sept. 30th, 1912.
41-45-45

CITY OF TORONTO

Main Drainage Works

Sealed tenders for the construction of Section No. 13 of the High Level Interceptor, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only up to noon of **Tuesday, October 22nd, 1912.** The work consists of the construction of about 3,060 lineal feet of four-foot diameter circular brick or concrete sewer with connections.

Plans, specifications, forms of tender and other information may be obtained at the office of the Commissioner of Works, City Hall, Toronto.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.
October 1st, 1912.
41-42-47

Outfall Sewer Tender

Tenders are required for Outfall Sewer by Town of St. Lambert. Plans and specifications can be seen at Town Hall from **October 3rd to 8 p.m. October 14th, 1912,** when tenders will be recceived and opened.

The Town will require an accepted cheque covering ten per cent. of cost on awarding contract.

J. G. BEATTY,
Secretary-Treasurer,
St. Lambert, Que.
F

Notice to Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on **Tuesday, October 22nd, 1912,** for the construction of the following sewer:-

Storm Overflow Sewer
Main Garrison Creek Division
Section No. 3

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications may be seen and forms of tender obtained at the office of the Commissioner of Works, Toronto.

The tenderers shall submit with their tender, the names of two sureties, or in lieu of said sureties, the bond of a Guarantee Company, approved of by the City Treasurer.

The usual conditions relating to tendering as prescribed by the City By-law must be strictly complied with.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.
City Hall, Toronto,
October 1st, 1912.
41-44

Special Notice to Contractors

Could supply you with any quantity of

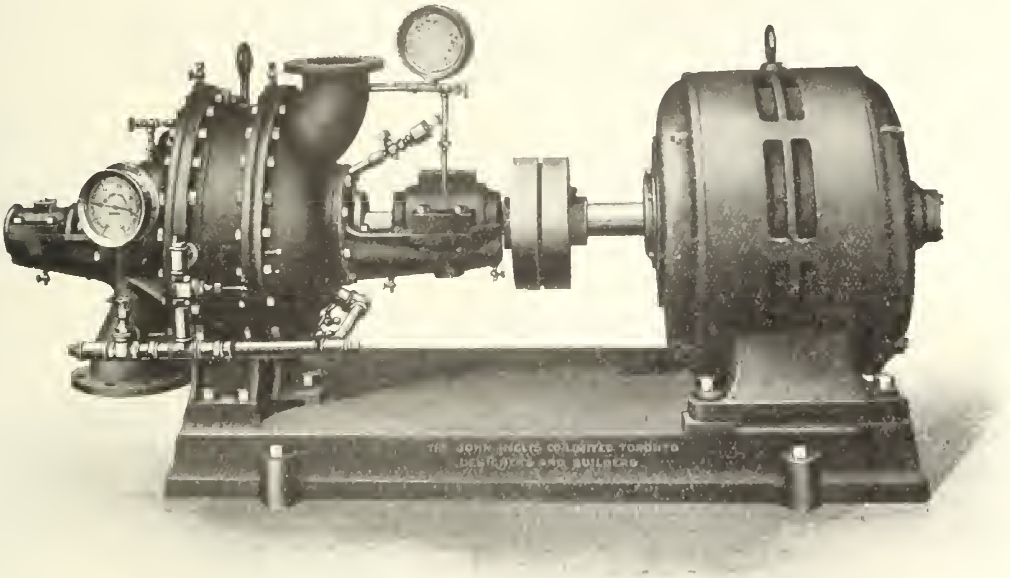
Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. 11-t.f.

Partners Wanted

The advertiser has just built and equipped the best plant in Canada for the manufacture of doors and boxes, and wants one or two good men with capital to join him, either a man to take the financial end and office work, or one with a good knowledge of the manufacturing end of the business. The trade in boxes will be local, but doors will be shipped to all parts of Canada as well as to England. There is not a large specialized door factory like this one in Canada to-day. The demand for doors is increasing rapidly, and car loads are daily being brought from the States which can be filled by a good Canadian plant. All correspondence will be treated confidentially. Address Box 614, Contract Record, Toronto, Ont. 41-42-46

Inglis Turbine Pumps



In every plant where high quality, efficiency and economy are the ***greatest*** considerations Inglis pumps are the first choice of both the owner and engineer.

There's an Inglis Pump for almost every service, and every pump is well designed, durable, reliable, economical.

Write us when in need of a Pump, Engine or Boiler

The John Inglis Company, Limited

ENGINEERS and BOILERMAKERS
14 Strachan Avenue, TORONTO, Canada

ANNOUNCEMENT

Steelcrete Expanded Metal

We have received exclusive rights for the sale of **"Steelcrete" Expanded Metal Products** in the Province of Quebec, manufactured by **The Consolidated Expanded Metal Companies** of Pittsburgh.

The excellent qualities of **"Steelcrete"** are well known throughout the world as an **Ideal** improvement and are well known throughout Canada, having been used in the largest and best Engineering-Construction Works.

We can sell the **world's best-made Expanded Metal "STEELCRETE"** at a price that will interest you.

We carry in stock at Montreal a large supply of standard sizes and can make immediate delivery.

Write us or call us up for samples, catalogues and prices.

We solicit your enquiries

Munderloh & Company, Limited

Montreal

MODERN BUILDINGS

REQUIRE

MODERN ELEVATORS

We build both plunger and electric elevators with patented improvements to secure better control and operation

THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO., LIMITED

Works: Seigneurs & William Sts., MONTREAL Sales Offices: MONTREAL, TORONTO, COBALT, WINNIPEG, CALGARY, VANCOUVER

Manufacturers of Boilers, Castings, Condensers, Elevators, Engines, Filters, Forgings, Hydraulic Machinery, Pumps, centrifugal and reciprocating, Steam Turbines, Tanks, Water Wheels, Water Works Plants

WATER PURIFICATION

¶ This problem has been solved in Britain by the Bell Systems of Pressure Filtration and Softening.

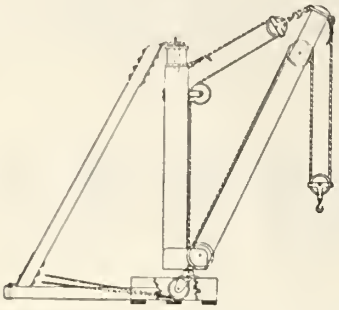
¶ The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

BELL FILTRATION CO. OF CANADA, LIMITED
305 KENT BUILDING, TORONTO

Hoisting Engines

DERRICKS

Horse Powers Winches or Crabs



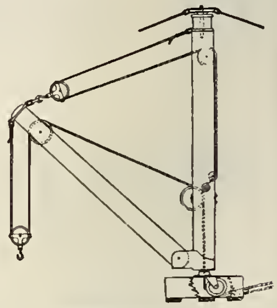
Standard sizes and capacities of Derricks in stock for immediate shipment

Get our catalog and Prices. They will interest you—All goods guaranteed

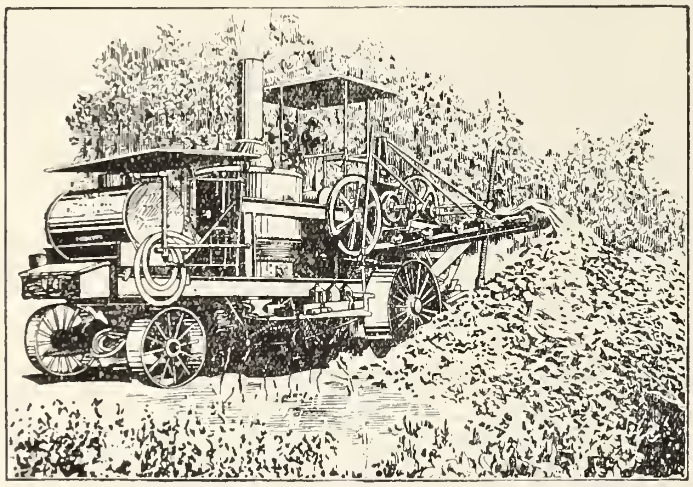
MARSH & HENTHORN
Limited

Makers of Hoisting Machinery **Belleville, Ontario**

Sales Agents: **MUSSENS LIMITED, Montreal**



TRENCHING MACHINES



This year, labor is going to be scarce and very expensive. The amount of municipal work is going to be large and unless the Contractor uses the proper machine he will be behind time. If he gets one of our "Trenching Machines," which can make a cut all the way from 27 in. to 60 in. wide and any depth down to 20 ft., he will be sure to fulfil his engagements and save a big percentage of money.

For further information, apply to

J. W. HARRIS MANUFACTURING CO.
LIMITED
MONTREAL

FOR SALE FOR IMMEDIATE DELIVERY

2—No. O Thew Steam Shovels Full Circle with ⅝ yard dipper
1—Little Giant Steam Shovel 26 Ton Traction one yard bucket
1—No. 1 Full Circle Vulcan Traction Steam Shovel
1—Buckeye Trench Machine, cuts trench 24″x 7½′
1—Buckeye Trench Machine, cuts trench 27″x 10′
1—Buckeye Trench Machine, cuts trench 24″ & 30″ x 12′
1—Parson Trench Machine, cuts trench 28″ to 60″ x 20′
1—Municipal Trench Machine, cuts trench 24″ to 72″x24′
1—1½ yd. Owens Clam Shell Bucket
2—1½ yd. Page Drag Line Buckets
1—1 yd. Obenberger Drag Line Bucket
5—1½ yd. Clam Shell Buckets (Brown Hoisting Mach. Co.)
1—J. I. Case 10 ton Steam Road Roller
1—Nat. Elevating Grader with horse and engine hitch
1—36 Gauge 16 ton 9x16-4 wheel Saddle Tank Locomotive
1—45 ton Vulcan Track Shovel

CREAM CITY EQUIPMENT COMPANY
600 Majestic Building, Milwaukee, Wis., U. S. A.

Deadened with Cabot's Quilt
THE CANADIAN CONSERVATORY OF MUSIC, OTTAWA, ONT.
E. L. Horwood, Architect, Ottawa.

"We use Cabot's Quilt next to the studding in all partitions and between ceiling and floors, . . . results . . . exceeded the most sanguine expectation of both Architect and Directorate."
H. PUDDICOMBE, Musical Director.

Sound-proof Floors and Partitions

No really successful schoolhouse, hospital, hotel, lodge or flat building, or similar structure can be built without sound-deadening. The "most perfect deadener" is

Cabot's Sheathing and Deafening "Quilt"

It is a thick, elastic cushion of dead-air spaces, scientifically designed to break up and absorb the sound-waves, and is the only deadener that can do so. Decay and vermin proof, and uninflammable. Also a perfect cold-proof lining for dwellings. Asbestos Quilt is the most fire-proof lining made.

Send for Samples and Catalogue

Samuel Cabot Inc., Boston, Mass., U. S. A.

Canadian Agents: Andrew Muirhead Company, Toronto.
Seymour & Company, Montreal. Henry Darling, Vancouver.
Braid & McCurdy, Winnipeg.
Canadian Equipment & Supply Co., Calgary

Cabot's Shingle Stains, Waterproof Cement Stains, Water proof Brick Stains, Conservo Wood Preservative

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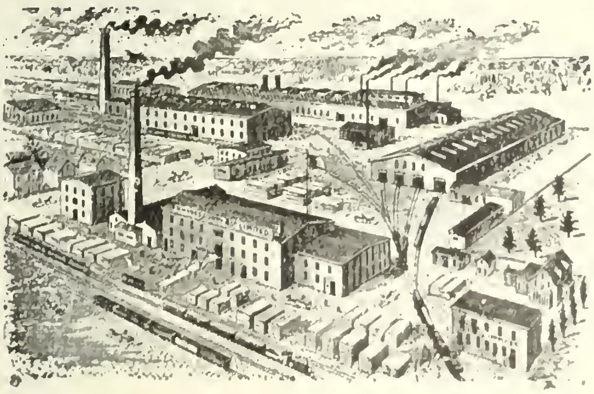
Rhodes, Curry Co., Limited

Lessees



Bank and Office Fittings

SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. Amherst, N. S.

BRANCHES AT
Halifax Sydney

Hayes Patent Metallic Lath

The positive key of the "Hayes" lath is unequalled in any other form of lathing. Examination of sample will prove this to you.

Specially suitable for tile work

SAMPLE BY MAIL ON REQUEST

The Metallic Roofing Co., Ltd.

MANUFACTURERS

Toronto, Ont. Winnipeg, Man.

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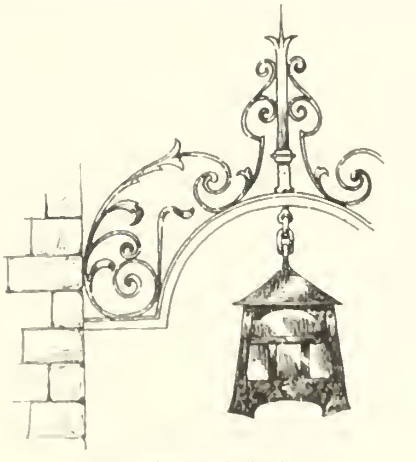
Ornamental Wrought Iron Work



We make and design

Wrought Iron Brackets — Lanterns and Lamps — Lamp Standards — Grills and Railings

Architects designs executed with fidelity and spirit

Dennis Wire & Iron Works Co.
London, Ont. Limited
Toronto Branch : 36 LOMBARD STREET

KERR

We are specialists in the design and manufacture of valves and hydrants for waterworks systems.

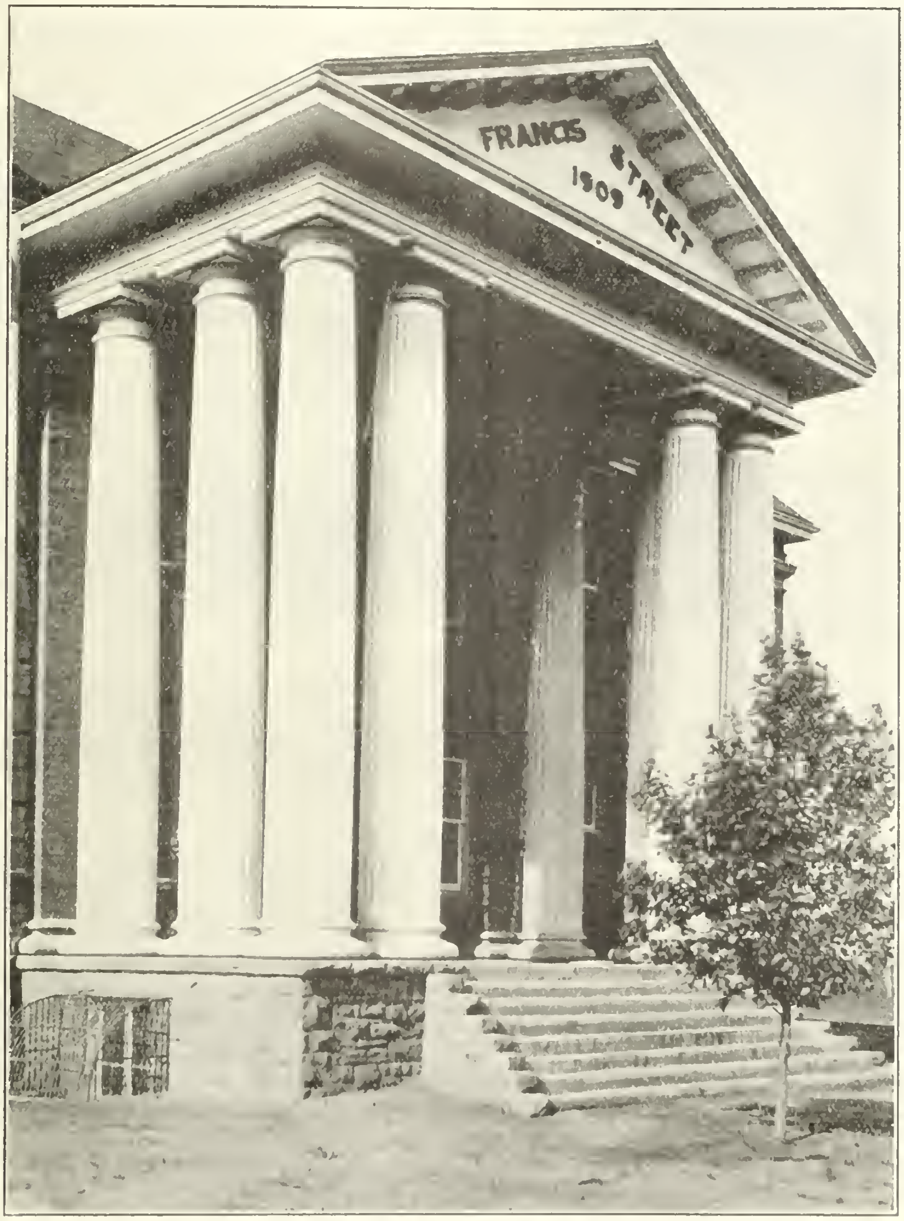
"KERR" are known from coast to coast for the reliable service they always give.

If your municipality are contemplating waterworks extension send us a list of your requirements and let us quote you.

Always Specify "KERR"

THE KERR ENGINE CO. LIMITED
VALVE AND HYDRANT MANUFACTURERS
WALKERVILLE, ONT.

STAVED COLUMNS



We manufacture the most complete line of staved columns in Canada and can guarantee quality goods and prompt shipments. We also make

Veneered Doors, Newel Posts, Flooring, Pine Doors, Frames, Sash, Trim, Etc. Newel Posts and Balusters. Cypress Green House Material

WRITE FOR QUOTATIONS

BATTS LIMITED *Manufacturers*
Pacific Avenue, Toronto

BOILERS

FROM STOCK

We are prepared to furnish at once from stock **Return Tubular Boilers** in most standard sizes from 40″ x 10′ to 72″ x 18′.

These are new, have been inspected and tested and are in the best of condition.

If your size is not in stock we have facilities to put your order through with the least possible delay.

Write

The Waterous Engine Works Co. Ltd.

BRANTFORD - CANADA

Agency: Hugh Cameron & Son, Manning Chambers
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THE LARGEST MANUFACTURERS AND DEALERS IN CANADA OF

Contractors', Surveyors'
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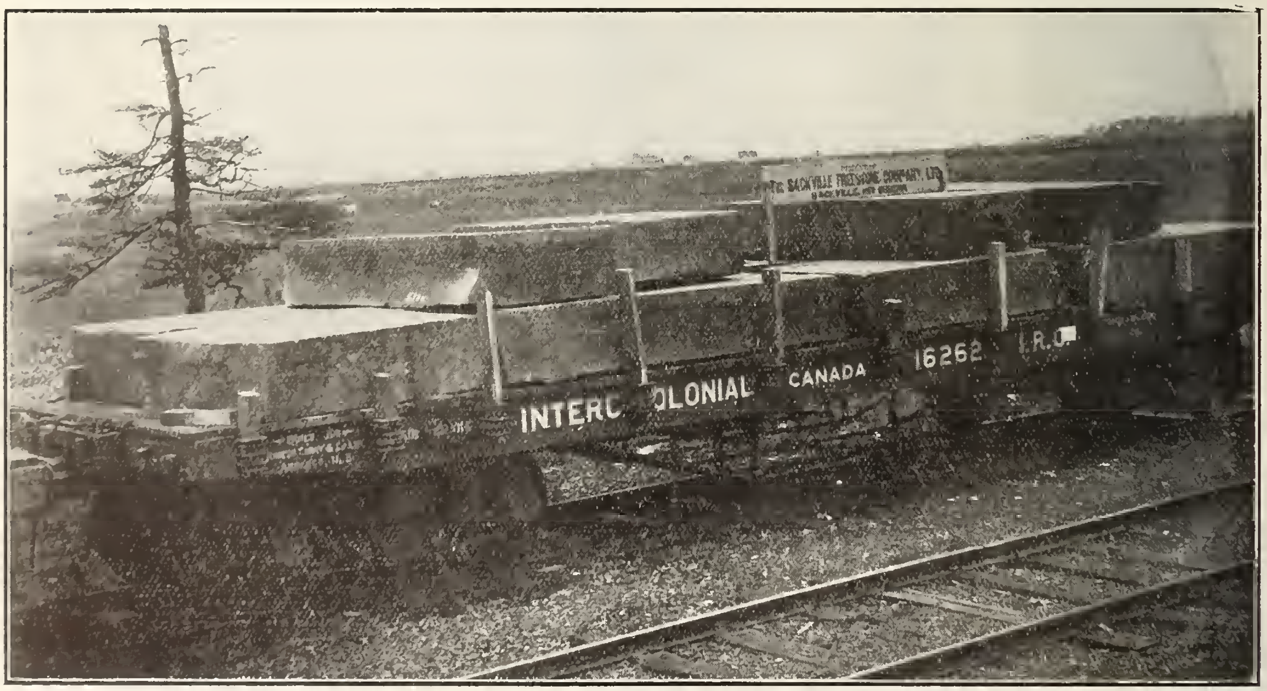
Tents, Covers, Straw Ticks, Sleeping Bags, Grey Blankets, Oil Clothing, Nose Bags, Coal Bags, Snow Shoes, Toboggans, Moccasins, Flags, Awnings, Sails, Canoes, Row Boats, Paddles, Oars and every description of Camp Supplies. Sole manufacturers of the Walsh Window Tent for Consumptives. Send us your orders.

Prompt Shipments Guaranteed.



Block Stone, Dimensions, Random, Head Sills, Shoddy, Stone Sawing

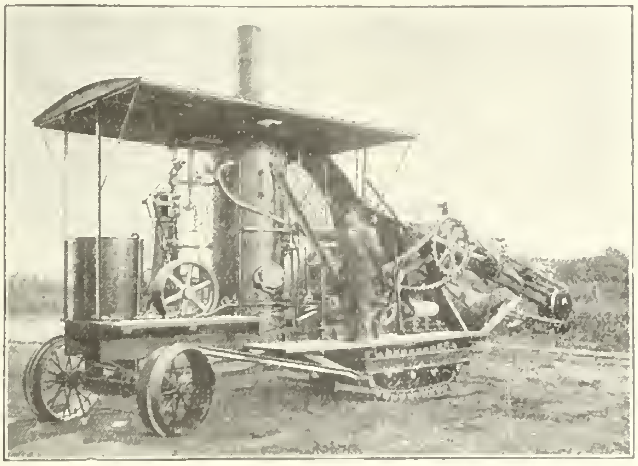
Sackville Freestone Co., Limited, Sackville, N. B.

WRITE US FOR QUOTATIONS

Power Is The Essence Of Trench Excavator Satisfaction

The knowledge that a trench excavator is adequate for any emergency and will respond to unusual demands is worth far more than it costs.

**All Steel
Construction
with
Manganese
Steel
Working Parts**



**Caterpillar
Tractions
Self-Cleaning
Buckets
Single Chain
Drive**

An Austin Trench Excavator

gives the owner an independence of conditions which delay and annoy the owners of less efficient excavators.

An Austin Trench Excavator

has a wide enough margin between the power ordinarily needed and the utmost power available to enable the machine to be crowded in speed or to be driven into a shale bank or even a soft rock with safety.

This Surplussage of Serviceability

means more than peace of mind in the drive of putting through a trenching job. It means extra profits. It means fewer repairs. It means longer life of the excavator itself. It means an all round successful trenching job whatever the conditions.

Competition in Trench Work

is between machine and machine, not between machine and hand work. Any trench excavator that is any good will outwork a pick and shovel gang but an Austin Trench Excavator outworks and outlasts other trench excavators.

SEND TO-DAY FOR CATALOG No. 108-A

F. C. Austin Drainage Excavator Company

Railway Exchange, Chicago, Ill.

Represented in Eastern Canada by Lecky & Collis, Napanee, Ontario.
Represented in Western Canada by The Canadian Equipment & Supply Co., Calgary; E. G. Cullen, Vancouver.
AGENTS WANTED IN OPEN TERRITORY.

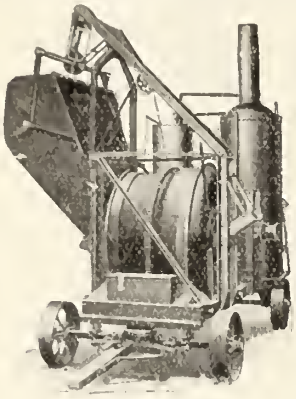
Deeds, Not Words!

Mr. Contractor—Don't take our word for it, that we have the best **Concrete Mixer** on the market, but ask any contractor who has used, or is using the

Chain Belt Mixer

just what he thinks of it.

IN MILWAUKEE there were about twenty concrete mixers sold in 1911, and fourteen were **Chain Belts.** Six of the leading concrete mixer concerns have their plants in Milwaukee. Draw your own conclusions, Mr. Contractor.



"The Mixer With the Bulge"

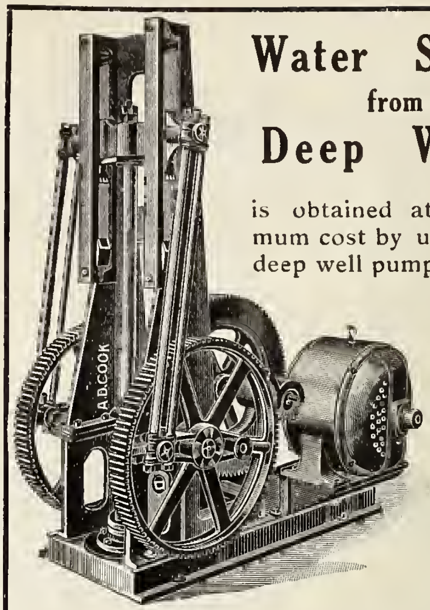
Where there is big construction work you will generally find a **Chain Belt Mixer** on the job. You owe it to yourself to investigate the **Chain Belt** before placing your order.

We also make elevators and gravity distributing systems. Send to-day to any of our agents for information.

Chain Belt Co.

Milwaukee, Wis.

CANADIAN AGENTS:
Winnipeg—Dominion Equipment & Supply Co.
Vancouver—Dominion Equipment & Supply Co.
Montreal—Canada Machinery Agency
Ottawa—The General Supply Co. of Canada



Water Supply from Deep Wells

is obtained at a minimum cost by use of our deep well pumps.

Write for
Bulletin 26
explaining
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Brass Tube
Well
Strainer

A. D. COOK

Lawrenceburg, Indiana, U. S. A.

Manufacturer of a Complete line of **DEEP WELL SUPPLIES** including Steam, Belt and Motor Driven **DEEP WELL PUMPS**, Wind-mill and Hand Pumps, Working Barrels and Valves; Pump Rods and Pump Rod Joints, Drill Rods and Drill Rod Joints, Drilling and Well Tools.

CATALOGUE MAILED UPON REQUEST.

WE SPECIALIZE IN INTERIOR FITTINGS

Our plant was designed specially for the manufacture of the finest fittings for BANKS, LIBRARIES, OFFICES, STORES AND PUBLIC BUILDINGS.

Architects and contractors requiring the very highest class of interior woodwork should send us their specifications. List of customers and references gladly furnished.

The
Oshawa Interior Fittings Company
OSHAWA, ONT.

PURE WATER

It is easy to obtain with our plants and apparatus

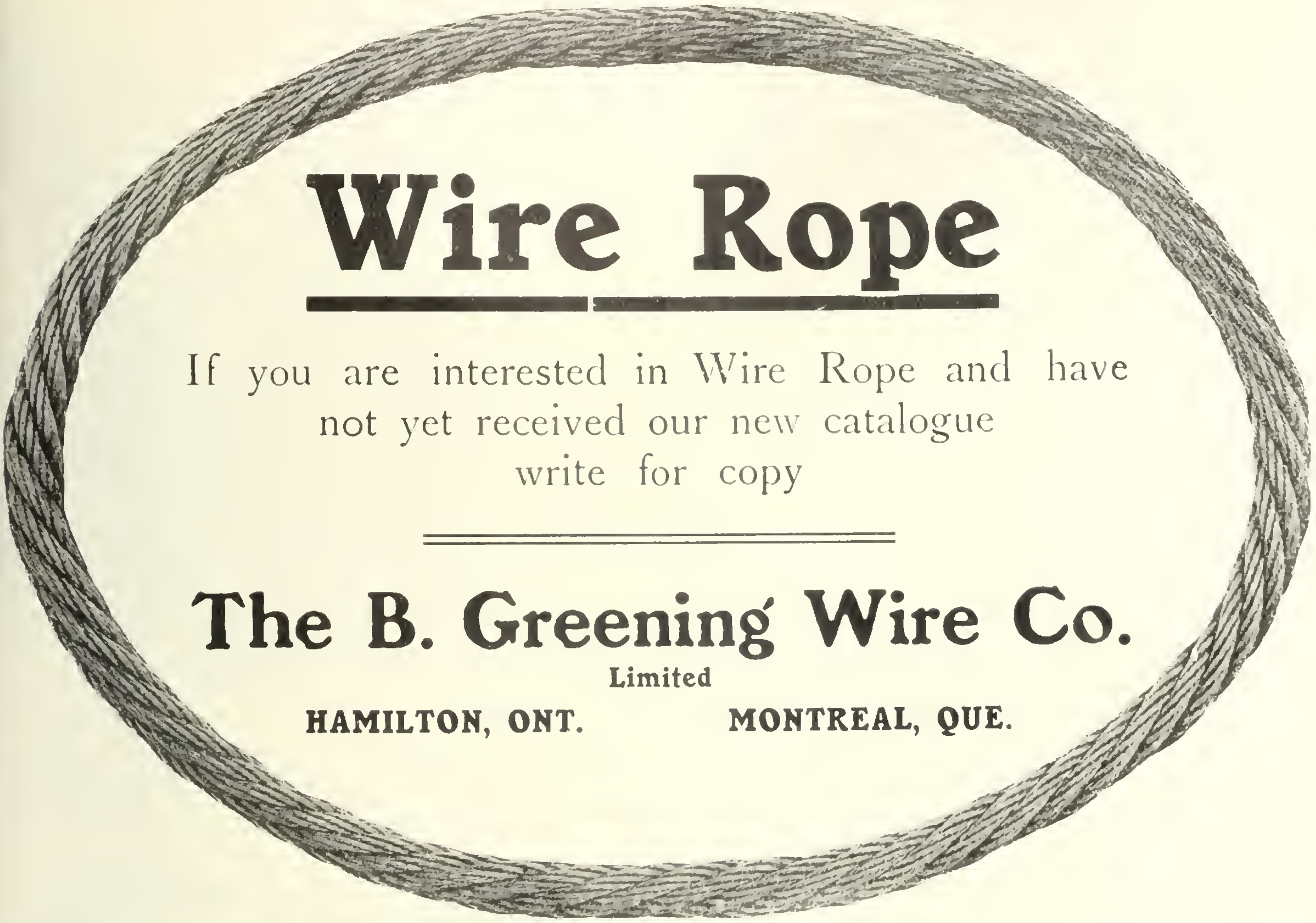
We design and contract for complete municipal filtration plants of any capacity.

We supply and install apparatus for sterilizing water supplies by the application of calcium hypochlorite.

Literature, Sketches, Estimates and Recommendations Supplied on Request

American Water Softener Co.
1001 Chestnut St., PHILADELPHIA, Pa.

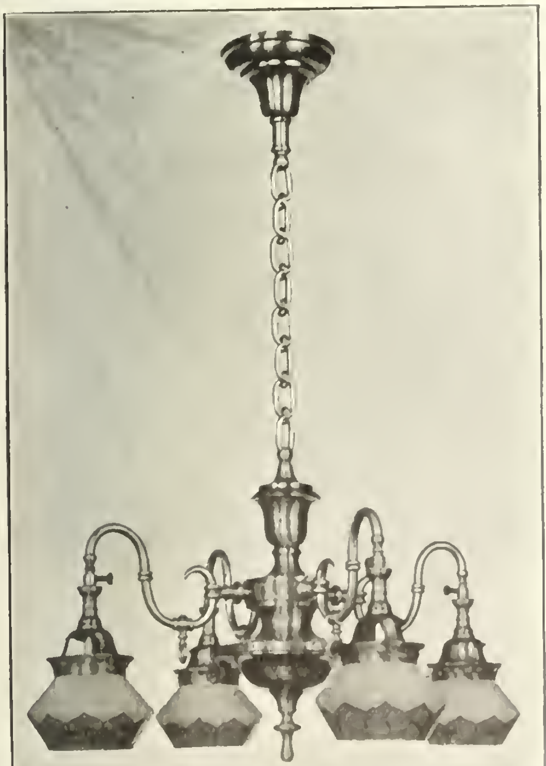
We have no affiliations or working acquirements with any of our competitors.



Wire Rope

If you are interested in Wire Rope and have
not yet received our new catalogue
write for copy

The B. Greening Wire Co.
Limited
HAMILTON, ONT. **MONTREAL, QUE.**



Artistic Fixtures And Gas—

ELABORATE fixtures are dependent, for their effectiveness, on the quality of the illuminant used. If the fixture be composed of **Art Glass** the light must be white to ensure a harmonious blending of the colors.

Gas sheds an intense white light, and when used in artistic fixtures makes them an ideal setting for an efficient and reliable illuminant. You get a steady white light, no eye strain, no flickering.

At our Adelaide Street showroom we carry an immense stock of all kinds of gas fixtures. They come in all sizes, designs, and prices. We cordially invite you to look over our assortment, and are assured that you will see something that will solve your lighting problem.

THE CONSUMERS' GAS COMPANY
12-14 Adelaide St. West, Toronto **Phone Main 1933**

BOOKS

for Engineers and Contractors

The following books are offered at special prices, subject to previous sale:

Hicks' Builders' Guide, by I. P. Hicks. Comprising an easy, practical system of estimating material and labor for carpenters, contractors and builders. Published in 1910 by David Williams Company, New York. 166 pages, illustrated. Price 50c.

Builders' Architectural Drawing Self-Taught, by Fred T. Hodgson. Published in 1904 by Frederick J. Drake & Co., Chicago. 262 pages, illustrated. Price 50c.

Architectural Hardwood Finishing, by George Whigelt. Published in 1906 by The Painters Magazine, New York. 124 pages. Price 50c.

Modern Workshop Hints, by Robert Grimshaw, M.E. Published in 1902 by Sampson Low, Marston & Company, London, Eng. 428 pages, illustrated. Price 50c.

Practical House Framing, by Albert Fair. Published in 1909 by Industrial Book Company, New York. 108 pages, illustrated. Price 50c.

Hints for Carpenters, by Albert Fair. Published in 1909 by the Industrial Book Company, New York. 144 pages, illustrated. Price 50c.

Architect, Owner and Builder Before the Law, by T. M. Clark. Publisted in 1905 by The MacMillan Company, New York. 387 pages. Price $1.00,

Properties of Steel Sections, by John C. Sample, C.E. Published in 1905 by McGaw Publishing Company, New York. 121 pages, illustrated. Price 50c.

American Renaissance (A Review of Domestic Architecture), by Joy Wheeler Dow. Published in 1904 by William T. Comstock, New York. 182 pages, illustrated. Price $1.00.

Modern Plumbing, illustrated, by R. M. Starbuck. Published in 1907 by Norman W. Henley Publishing Company, New York. 329 pages, illustrated. Price $2.00.

Reinforced Concrete, by A. W. Buel. Published in 1906 by the Engineering News Publishing Company, New York. 500 pages, illustrated. Price $1.00.

Practical Hand Book for Millwrights, by Calvin F. Swingle, M.E. Published in 1910 by F. J. Drake & Company, Chicago. 426 pages, illustrated. Price 50c.

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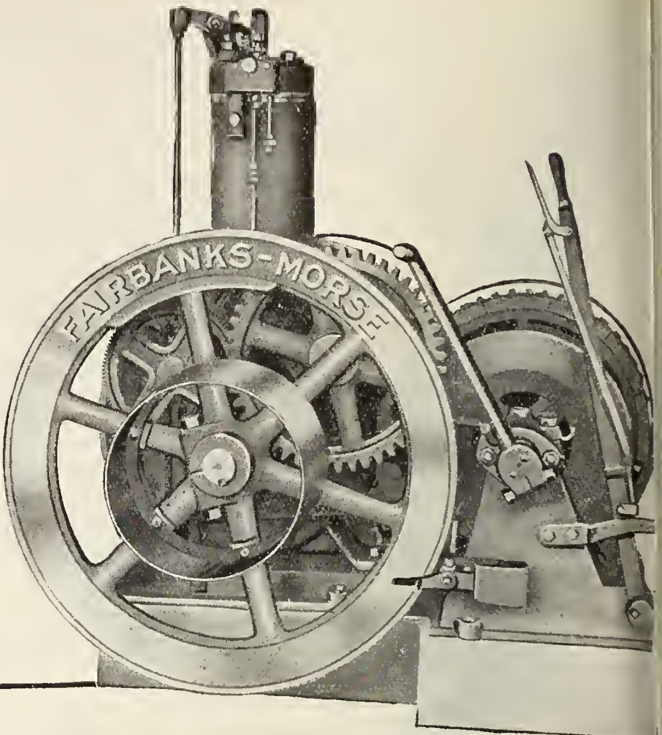

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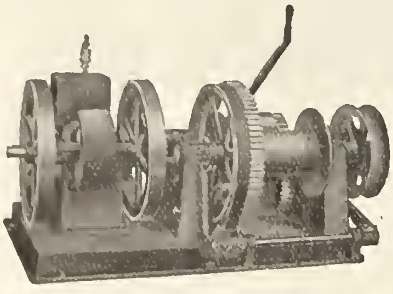

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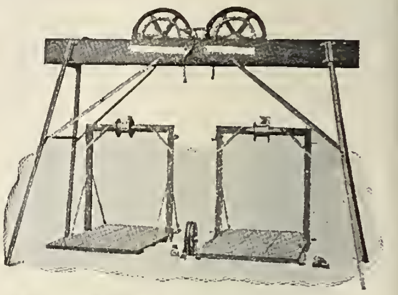

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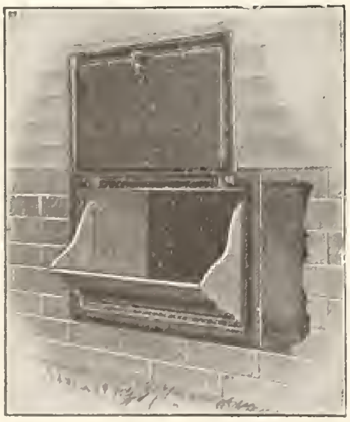

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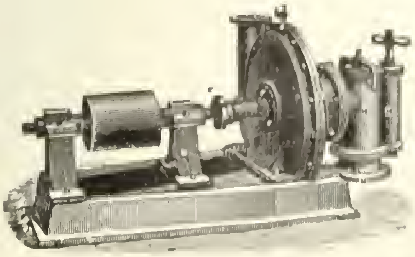

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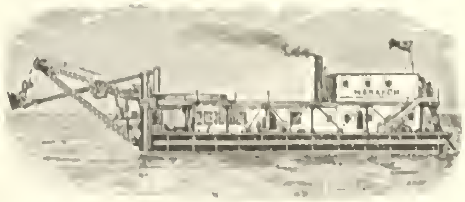

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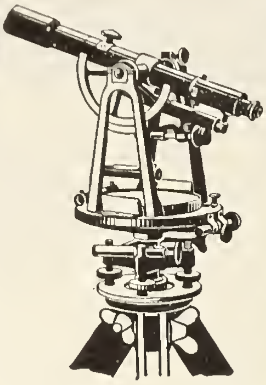

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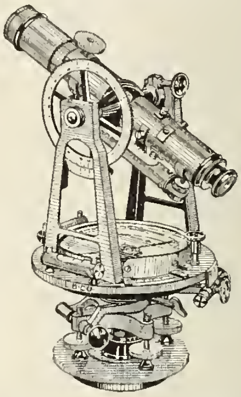

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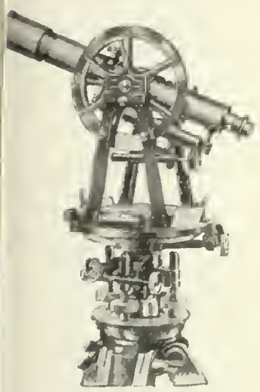

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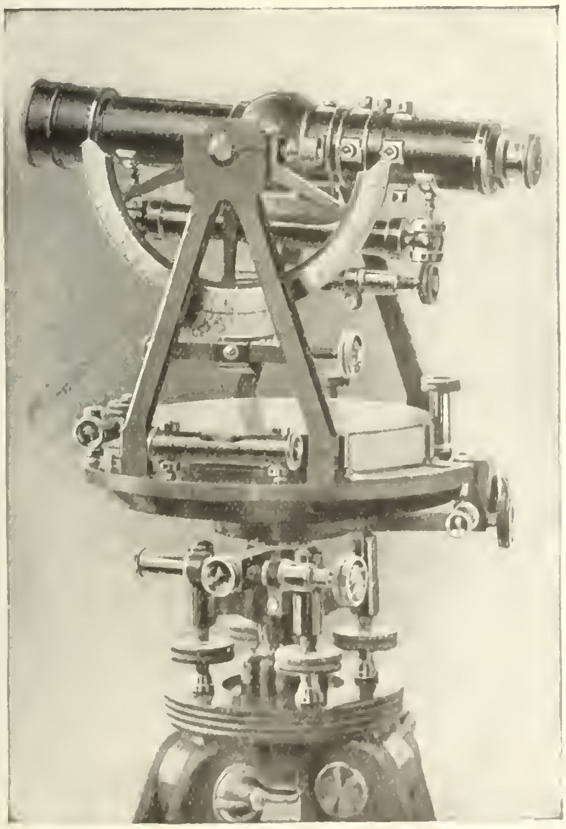

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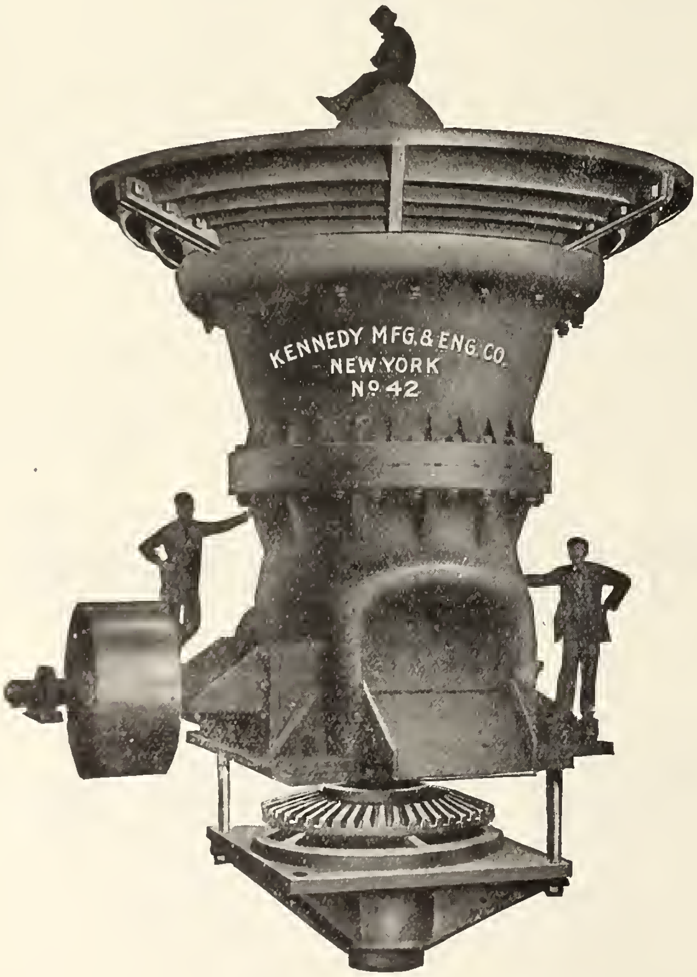

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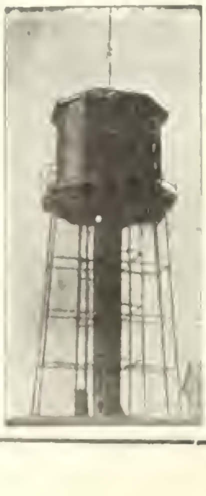

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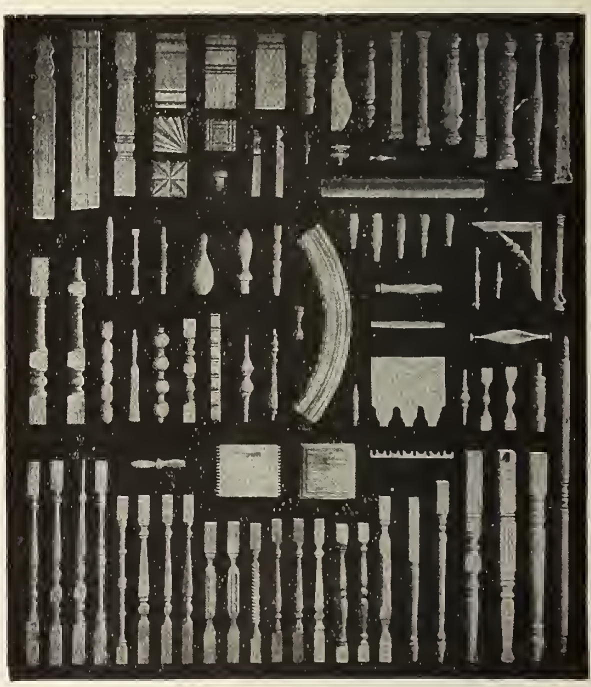

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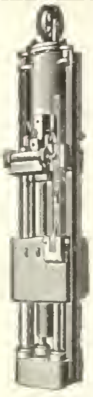

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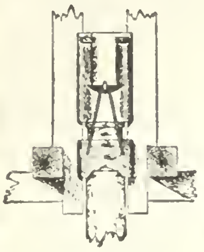

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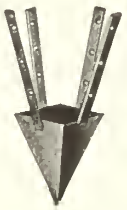

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Producers of Dark Hollow Buff and Blue
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Mill blocks, sawed, planed and turned stone of every description furnished on short notice. Write for information.

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Johnson's Reliable Veterinary Remedies

will give you better satisfaction for less money than any other preparations on the market. They are being used by most of the large horse owners throughout Canada—particularly by the Lumbermen and Railway Contractors.

The lines that are selling best are:

Johnson's Horse Liniment, No. 1 (Alcoholic)

1 gal. jugs (Imperial)	$1.50 gal
1 lb. bottles	8.00 doz.
2 lb. bottles	15.00

Positively the best all round Horse Liniment made.

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1 gal. jugs (Imperial)	3.00 gal.
1 lb. bottles	6.00 doz.
2 lb. bottles	11.00 doz.

Johnson's Horse Colic Remedy

A sure and speedy cure for all kinds of Colic

1 gal. jugs (Imperial) 40 doses	5.00 gal.
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2 lb. bottles 8 doses	15.00 doz.

Johnson's Veterinary Healing Ointment (Gall Cure)

2 lb. tins	2.00 per tin
4 oz. tins	3.50 doz.

Johnson's Condition Powders (Concentrated)

1 lb. packages	3.60 doz.

A full supply of all drugs and patent medicines at lowest wholesale prices.

Have you ever used for your men

Johnson's Mosquito Oil 1.75 doz., 18.00 per gross
It positively does the trick

Our prices are lower than those of all other manufacturers. Letter orders receive prompt attention.

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OF ALL DESCRIPTIONS

Are you satisfied with your wheelbarrows, if not you can purchase the "Bull Frog" brand from Dominion Equipment Co. of Winnipeg, and A. J. Brown-Jamison Co., of Vancouver, and be assured of satisfaction.

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of all designs in both iron and steel; Roofs, Telephone Poles, House Girders and all kinds of Structural Iron Work.

Our stock in hand comprises Steel Beams, Angles, Tees, Channels, Plates, Rolled Edged Flats, Bars, Rivets, Rounds, &c.; Iron Beams, Bars, Squares Turnbuckles, Rivets, &c.

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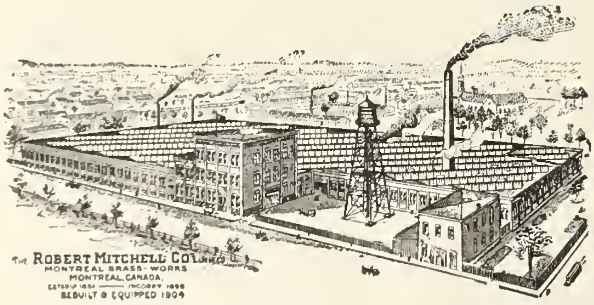

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We carry in stock at Montreal, 5,000 tons of Structural Shapes and are in a position to make quick shipment of either plain or riveted material for

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Memorial window designed and executed by Wm. Briscall Co.

Art Windows for churches, residences, public buildings, &c., &c. Special designs and estimates submitted. Every attention given to decorative styles where required.

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For water works systems, domestic water supply and hydraulic mining. Insulated wire conduits; steam pipe casings; acid-proof pipe for mines, tanneries and pulp mills. Sizes from 2 inches to 24 inches.

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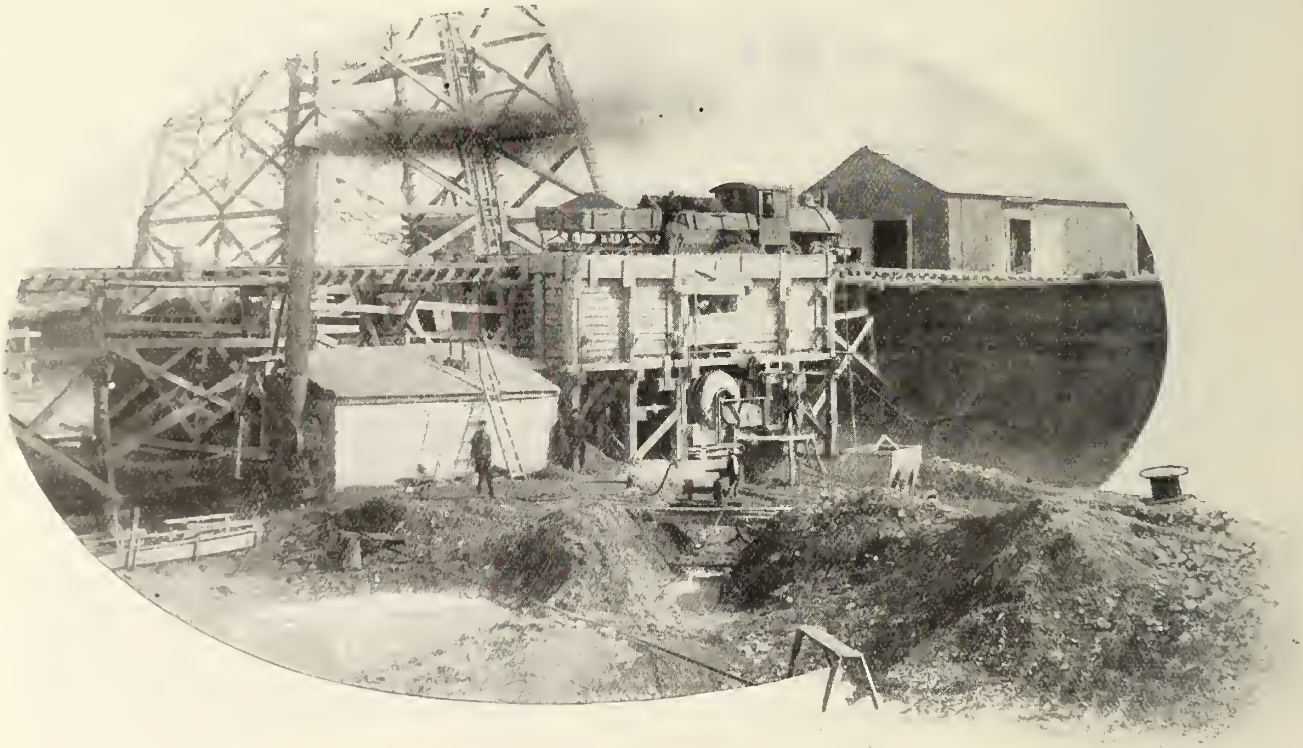
THEY ARE ON THE JOB CONTINUALLY



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3 inches to 60 inches diameter
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Iron Ore, Pig Iron, Car Wheels, Cast Iron Water and Gas Pipe, Specials, Valves, Hydrants, etc., Castings of all kinds, Mooring Bollards for both Concrete and Wooden Docks, Hoisting Machinery.

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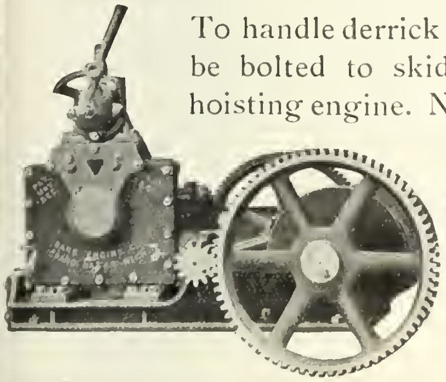

To handle derrick booms. Can be bolted to skids in front of hoisting engine. No dead center.

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"TAMCO" Crushed Stone in all sizes, for all purposes.
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Driller of Oil, Gas, Salt or Artesian Wells
Deep Wells a Specialty

20 YEARS' EXPERIENCE IN CANADIAN OIL FIELD

Contracts taken in any part of Canada. Several years experience in Artesian Wells for Municipal Water Works. Estimates or geological information cheerfully furnished.

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"ELECTRIC - AIR"

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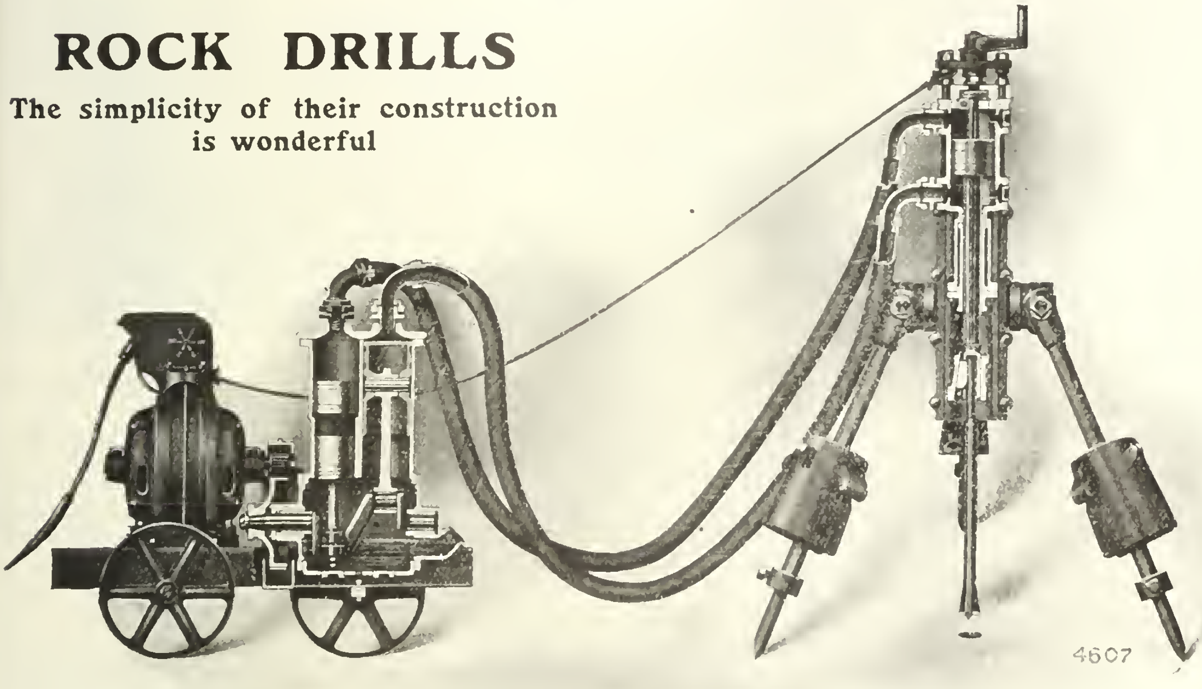
The simplicity of their construction is wonderful



The TEMPLE-INGERSOLL "Electric-Air" Rock Drill is destined to become a large factor in the contracting field of the future.

Think of it!

You have an electric motor direct connected to a pulsator mounted on a truck.

The pulsator is connected by two short lengths of hose to the drill. Air is simply forced back and forth in this closed circuit and acts as a power conductor.

No waste of air at high pressure. This alone means a saving of 66% to 75 . Worth considering isn't it?

Now the point we want to make is this. Is not this truck, with a motor and a pulsator on it, and the drill more easily handled than an unweildy boiler which takes a couple of horses to move.

The saving is tremendous.

One man can run the whole plant.

If a site for a building has to be excavated there may be a large amount of rock work. Electric power is almost certain to be right at hand.

The buying of power is a detail.

Can anything be more simple, compact and economical than this "ELECTRIC-AIR" rock Drill?

Put a TEMPLE-INGERSOLL outfit on your next job. It will pay you.

Our pamphlet on these machines ought to interest you

CANADIAN INGERSOLL-RAND COMPANY
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COMMERCIAL UNION BLDG. - MONTREAL, CAN.

SYDNEY MONTREAL TORONTO COBALT SOUTH PORCUPINE
WINNIPEG LETHBRIDGE ROSSLAND VANCOUVER

Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete.

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works

45 BROADWAY, NEW YORK

Practical
Cost
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Herringbone Metal Lath

The ceiling of the Power House of the Toronto General Hospital measures one hundred and twenty yards net. One hundred and twenty-two yards of **Herringbone Lath** covered it completely, waste and lap included.

This is not a record; it is a typical case. The Herringbone selvage edge is the reason.

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, Toronto
Metal Shingle and Siding Co., Manufacturers

TENTS

for Engineers and Contractors

We are manufacturers of a very complete line of tents for engineers' and contractors' use and can make shipment the same day as order is received.

We also make engineers' and surveyors' clothing, in fact we can fit you completely for camp and survey trips.

Send for our catalogue
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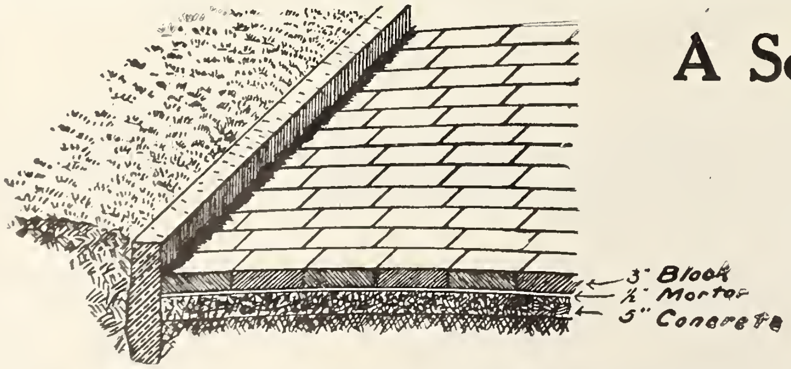


A Scientific Pavement

must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
Send for Descriptive Literature

The Ontario Asphalt Block Company, Limited - Windsor, Ont.

The Mullen Combination Tar Kettle and Gravel Heater

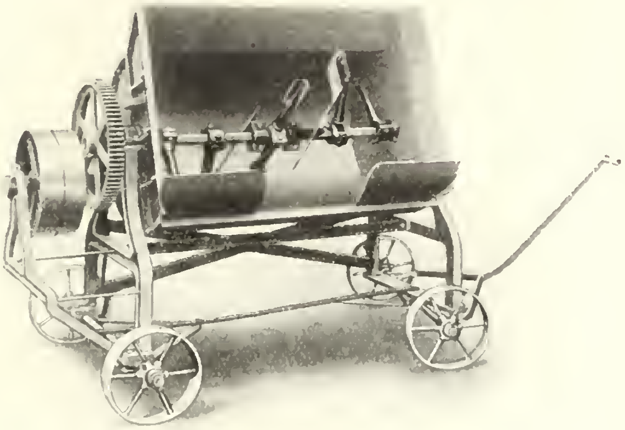
A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

Write us for particulars

Tide Water Iron Works
HOBOKEN, N. J., U. S. A.

The Mixer With a Record



THE BLYSTONE HAND TRUCK MIXER

For combination shop and outside use this Hand Truck Mixer is acknowledged to be the very best on the market. It has been used on hundreds of sidewalks and foundation contracts with unqualified success. It is strongly built and so simple in design that it will never give any trouble with repairs.

Strongly Made—Well Balanced Easy to fill—Easy to Dump

Send for Catalogue

The Blystone Machinery Company
61 Railroad St., CAMBRIDGE SPRINGS, Pa., U.S.A.
Full line of Blystone Mixers carried in stock by
The A. R. WILLIAMS MACHINERY COMPANY, Limited
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Sole Distributors for Canada

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"Asbestoslate"
Shingles

ROOFING THAT SAVES WORRY

When a roof is made of

ASBESTOSLATE

Shingles, you have the satisfaction of knowing that unless the building falls from under it that roof is up for all time.

You will not have to patch it or paint it every year or so to keep it watertight. When it's up, you are through with it,—and you'll save labor cost in putting it up.

Made of asbestos fibre interwoven into hydraulic cement, they are light-weight, tough and fire-proof. Write for Booklet C. R. giving information on asbestos Building Material.

THE ASBESTOS MANUFACTURING CO., LIMITED
Eastern Townships Bank Building, MONTREAL Factory at LACHINE, P.Q.

There is nothing magical or mysterious about it . .

Our service is the plainest and simplest aid to present day merchandize distribution. Our reports provide a short route by which the man who *sells* something may know who *wants* it.

A house such as ours gathers information from many sources unknown and unavailable to others. Through our wide-flung organization we have immediate access to facts of dependable character—information which tells daily where there are opportunities for your getting business.

Our whole theory is to seek business on the basis of service—not price, and then extend to the clients thus obtained the broadest and most modern service available for locating possible buyers for their goods, rather than try to get them by a cheap and tawdry display of special information or mis-information cooked up to satisfy the prospect.

Please bear in mind that a gold-brick always looks good. It has to. Its superficial appearance is its sole virtue. We are perfectly willing to admit that we are out-promised every day; but we try to make performance square with promise.

The thought that you will be interested in knowing the policy, plan and methods which have given this company the unquestioned position of INFORMATION HEADQUARTERS prompts our extending an open invitation to you as a business man, if you are interested in our service as an aid to your making sales, to advise us that we may write you and discuss the subject from the viewpoint of your own business.

MacLean Daily Reports, Limited

220 King Street West, TORONTO, ONT.

MONTREAL - WINNIPEG - VANCOUVER

Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered Toronto:—

	Per M
o. 1 dry pressed red brick	$18 00
o. 1 dry pressed buff brick	18 00
ed Stock Bricks	12 00
ey Stock Bricks	11 00
ire cut bricks for foundation work	11 00
orous terra cotta bricks	15 00
o. 1 enamelled bricks, all colors, from	$80 00 to $150 00

LUMBER (Building Material)

emlock Lumber—		
in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
x 4 to 2 x 12, 16 ft.	24 00	
x 4 to 2 x 12, 18 ft.	26 00	
in. Hemlock, No. 1	20 00	23 00
o. 1 Hemlock Decking	24 00	
o. 2 Hemlock dimension and 1-in.	16 00	18 60
ine—		
in. common pine 8 to 12 in wide rough	27 00	30 00
in. white pnie Bill stock	29 00	33 00
8 x 8 and 10 in. pine shelving	36 00	40 00
8 x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
pruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	
Pine trim for paint finish		
4 in. casing per 100 ft.	2 00	
5 in. casing per 100 ft.	2 25	
8 in. pine base, per 100 ft.	3 25	
10 in. pine base, per 100 ft.	4 25	
4 in. pine window stool	2 75	
Shingles—		
XXX B. C. Clear Shingles, per M.	3 60	
X. B. Extras	3 50	
X. B. Clears	2 90	
No. 1 pine lath, per M.	4 75	
No. 2 pine lath	4 25	
No. 1 spruce lath	4 00	
Cedar Posts—Fence—		
5 in. at small end, each	25	
7 in. at small end, each	35	
Hemlock lath	3 25	

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 per cent, for approved specifications:

	Star	D.D.
10 to 25 united inches	$1.25	$ 6.25
26 to 40 "	4 65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11 00
81 to 85 "	7 00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		21 00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:

MONTREAL

	Star	D.D.
25	$3 25	$4 75
40	3 45	5 20
50	3 85	6.00
60	4 10	6 50
70	4 35	7 00
80	4.85	7 50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26 40	3.75	5.50
41 50	4.25	6.25
51 60	4 75	7.00
61 70		8.00
71 80		9.00
81 85		10.00
86 90		11.00
91 95		13.00
96 100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 and 5 per cent.

High grade compression work, 55 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 65 and 5 per cent; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 1½ Fuller's .... net $2.50

Square head brace cocks, 60 per cent.

Lead Pipe

Lead pipe, $7.85 net; lead waste, $9.35 net; caulking lead, 5½ cents per lb.; traps and bends, 30 per cent; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$1.93	¼ inch	$2.75
⅜ "	1 93	⅜ "	2.75
½ "	2.55	½ "	3.49
¾ "	2.99	¾ "	4.14
1 "	4.29	1 "	5.94
1¼ "	5.85	1¼ "	8.10
1½ "	7.02	1½ "	9 72
2 "	8.82	2 "	12 12
2½ "	11.09	2½ "	19.84
3 "	18.50	3 "	26.65

Malleable fittings Canadian discount, 40 and 12½ per cent.

Cast iron fittings, 60-10; headers, 65, flanged unions, 70; malleable bushings, 70; nipples, 1 inch diameter and under, 80; nipples, 4½ inch and up, 75; malleable lipped unions, 65 and 10 per cent.

Plain steel bars, $2 05.

Square twisted bars, ¾ to 1¼, $2 15.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6 inch, 70 per cent.

7 and 8 inch pipe, 50 per cent.

Sewer Pipes

4 in.	25c ft	15 in.	1.50 ft
6 in.	40c ft	18 in.	1 90 ft
9 in.	60c ft	20 in.	2 25 ft
12 in.	1 00 ft	24 in.	3 25 ft

[illegible]

CEMENT, STONE, STEEL, Etc

Cement, [illegible] in [illegible] Toronto, bags extra, $1 80.

Cement [illegible] Toronto, [illegible] $1 55.

Crushed stone, [illegible], $1.30, [illegible], $1.50, [illegible], $1 45.

[illegible] stone, $1.30 per ton, [illegible].

[illegible] River [illegible], $1[illegible] to $16 per ton.

[illegible] $1[illegible] to $1[illegible] [illegible].

[illegible] $2.25 to $2.50 per yard.

[illegible], $2.25 to $2.50 per yard.

Sand, [illegible] $1.15 a yard f.o.b. [illegible].

[illegible] 40 [illegible] per load.

Rubble stone in car lots, $1.30 per ton.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, 9.00 in car lots.

Lime, per cwt., delivered, not less than 1,500 lbs., 33 cents; white, 43 cents.

Manilla Rope, best, per pound, 12½ cents.

PAINT AND OILS
(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $9.00 per 100 lbs.

Boiled Linseed Oil, in barresl, 86c per gallon.

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Pure Red Lead, dry, $7 to $8 per 100 lbs.

Putty, pure linseed oil, in bulk, bbls., 3½c.

Putty, pure linseed oil, in 25 lb. tins, 4c.

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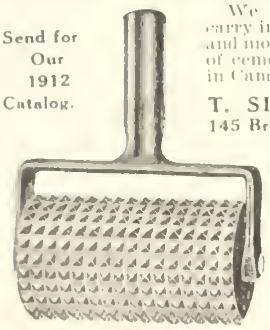
Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turn over buckets, two (2) marine engines, boilers fuel lighter with whirley aboard. Address

CLEVELAND & ERIE MACHINERY CO.
1515 Rockefeller Bldg., Cleveland, O.

Cement Sidewalk Tools



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Our
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We manufacture and carry in stock the largest and most satisfactory line of cement sidewalk tools in Canada.

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In three years time water gains access to foundation. Cost to repair	$100.00
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Saving	$ 50.00

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Dehydratine No. 1—A damp-proofing agent applied to inner walls a furring substitute.

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Are made according to the specifications of the National Board of Fire Underwriters. The conductors are drawn from copper of the highest conductivity and are covered with two thicknesses of thoroughly vulcanized rubber compound of high quality. The wires are braided over insulation and the smooth high finish they receive makes them specially desirable for conduit work.

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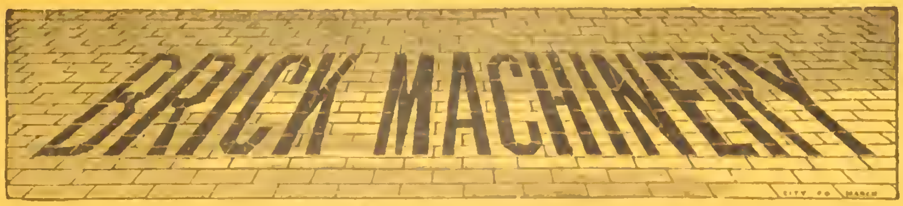

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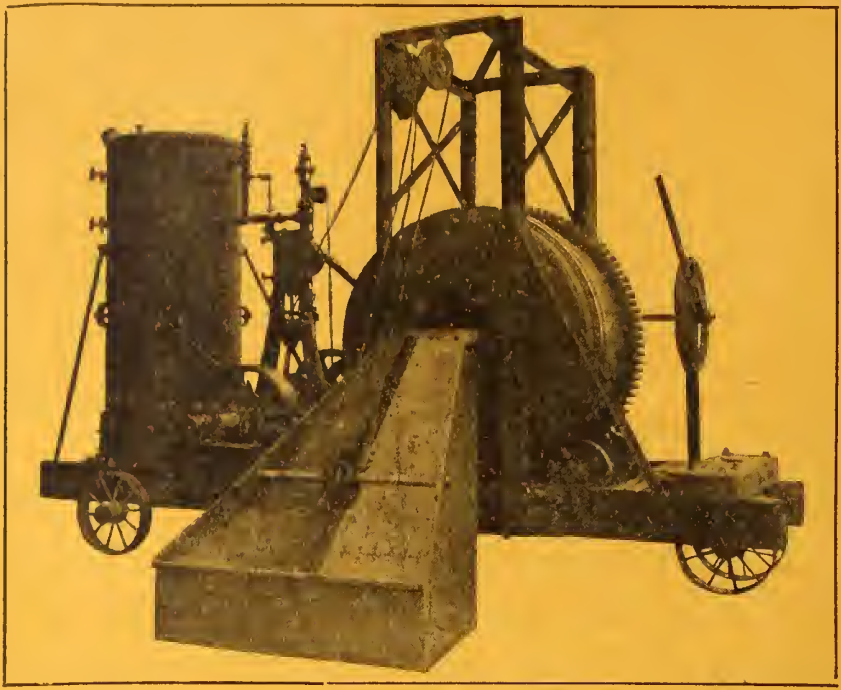

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When buying a Concrete Mixer

It's not the first cost

But the ultimate cost that counts

You can undoubtedly find many concrete mixers whose first cost is less than the Ransome—but is their ultimate cost less? That's the point.

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Our Ransome Mixer is the most reliable, efficient and durable mixer on the market. Simple in construction—repair bills are practically nil.

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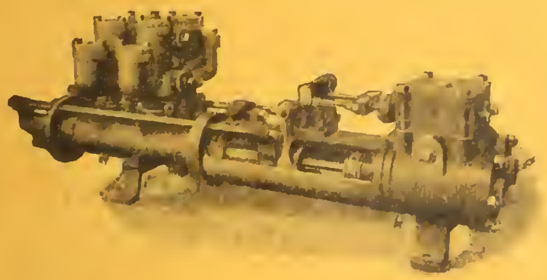
Vol. 26 Toronto, October 16, 1912 No. 42

ESTABLISHED 1886

Contract Record and Engineering Review

We Manufacture Steam and Power Pumps, Condensers, Travelling Cranes, Etc.



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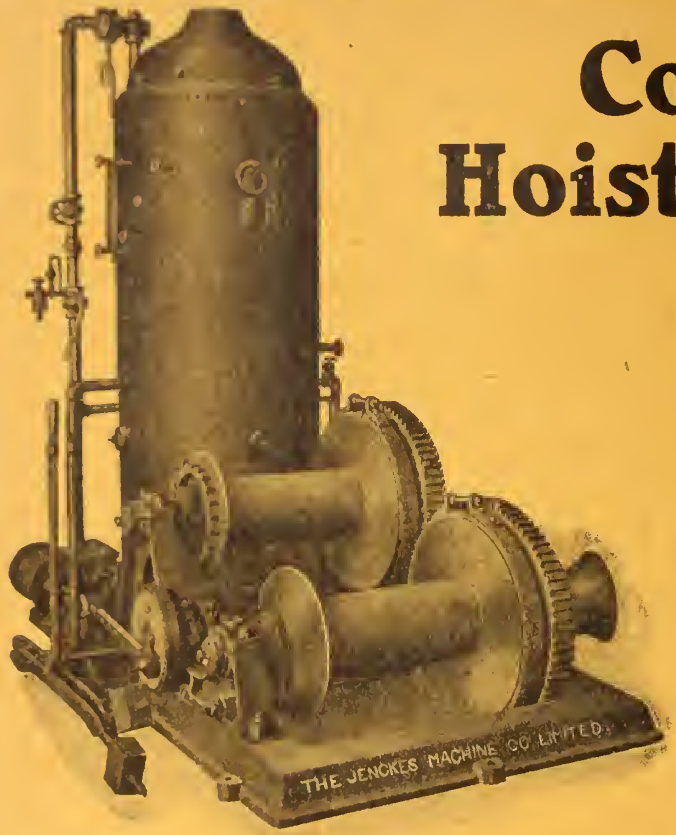

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¶ Especially designed to fully meet the peculiar requirements of Contractors' work.

¶ Great care has been taken to secure maximum strength and rigidity without unnecessary weight.

¶ Built in all the popular sizes.

¶ Full particulars and prices to interested parties on request.

The
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into the hardest kind of service

"AMERICAN" Wire Rope Blocks

will prove their makings and materials every time.

They will safeguard the lives of your men, your expensive material and your equipment.

They cost no more than the cheap kind but they're worth more.

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$$\frac{\$1{,}000}{\$6} = 166.6 \text{ miles.}$$

The cost of keeping a mile of macadam road in good condition for one year will pay for the maintenance of $166\frac{2}{3}$ miles of concrete road for same period.

The first concrete road was built in Bellefontaine, Ohio, nineteen years ago. The cost of maintenance has averaged **$6 per mile per year.**

Six years ago New York State started to build 12,000 miles of macadam road. Fifty million dollars was voted for the work. To date, 3,674 miles have been improved, and $49,000,000 has already been spent—or over $13,000 a mile—and the present cost of maintenance, only six years after the first mile was built, is **$1,000 per mile per year.**

Is it any wonder that the New York Road Commission, in asking for another fifty millions, has promised the people to spend it for concrete highways?

Wayne County, Michigan, has built 33 miles of concrete roads since 1909, and the farmers of Wayne County are so well satisfied that they no longer consider macadam roads.

Canada's era of road building is just beginning. Will she profit by the experience of these other commonwealths? Will she spend her road money on roads that constantly need repair—or will she build permanent roads?

The engineers of our Free Information Department will gladly supply any information on concrete highways that is desired, without cost or obligation to the enquirer.

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We wish to advise our patrons throughout the Province of Ontario that we are now occupying our new Warehouse in Toronto at **155 West Richmond Street,** where we will carry a complete stock of supplies such as

Smith Mixers, Chicago Mixers, Smith Hand Mixers, Hoisting Engines, Rock Drills, Wheel Barrows, Scrapers, Shovels, Steel, Picks, Tools, etc.

We also have a full line of

Road Machinery

such as

Road Rollers, Graders, etc.

We trust our efforts to give quick shipments in this direction will be appreciated and we trust to have your hearty co-operation

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Toronto, 155 West Richmond St.
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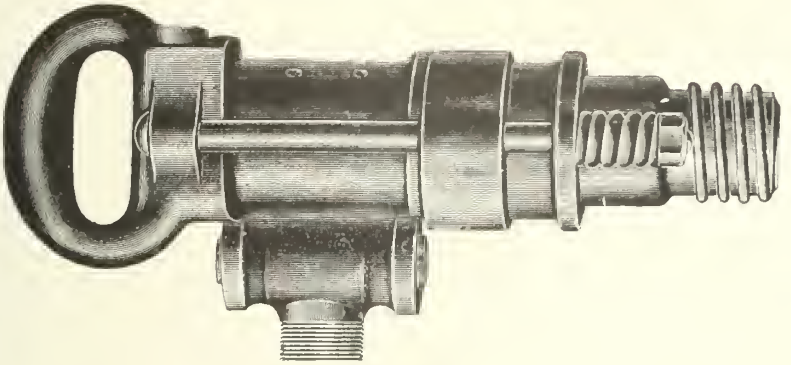
A Time Saver



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is positively the fastest Boring Hand Hammer Drill on the market.

It will drill to a depth of 15 feet if necessary.

Automatically rotates its own Drill Steel and uses less air or steam than any other drill.

The **Hardy Simplex** is made from Dropped Stamped Steel Forgings throughout.

Only weighs twenty six pounds, and is the latest success in a one-man drill.

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(Continued on page 12)

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"SPECIFY DON VALLEY PRODUCTS"

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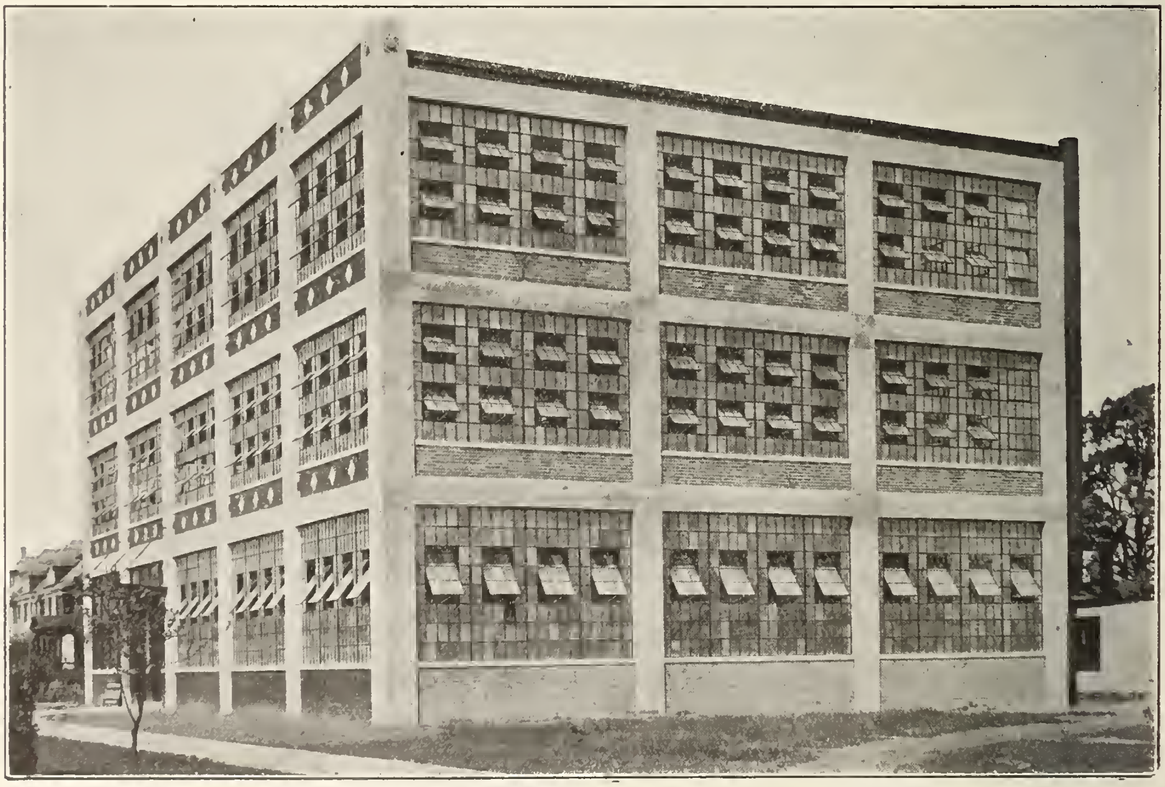
FENESTRA STEEL SASH not only increases production, but also reduces costs. Window upkeep expenses and artificial lighting bills are reduced almost to the vanishing point.

FENESTRA SASH is inexpensive compared with wooden sash, which is short lived and inflammable. It affords the minimum obstruction to light. It is attractive in appearance, strong and durable. Made to meet all conditions and sizes of window openings.



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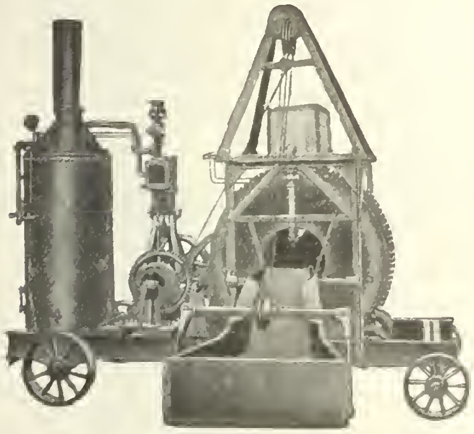
STEEL AND RADIATION, LIMITED

TORONTO, CANADA

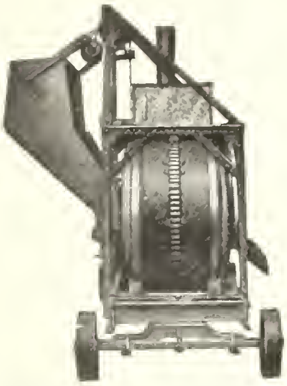
Concrete Mixers



Standard Drum Batch Mixer

SEVERAL KINDS and built in sizes to suit all classes of work.

The Many Improved features of the London Mixers have placed them in a CLASS BY THEMSELVES.



Standard Drum Batch Mixer

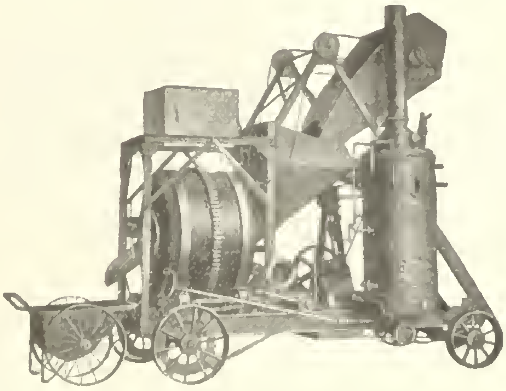
WE CAN SAVE THE CONTRACTORS MONEY. **EVERY MACHINE MADE IN OUR OWN FACTORY.**

On FIRST COST.

On COST OF MAINTENANCE.

On COST OF OPERATION.

SEND FOR OUR CATALOGUE



Rear Discharge Paving Machine with Forward Loader

Our Machines are not made down to a price, but MADE UP TO A STANDARD.

By Manufacturing IN A LARGE SCALE we have been able to offer High Grade Machines AT REMARKABLY LOW PRICES.

Paving Machine with Side Loader

We manufacture a full line of Concrete Machinery and Cement Working Tools. Also a full line of Hoisting Engines and Contractors Equipment.

We are the Largest Manufacturers of Concrete Machinery in Canada.

No. 2 Automatic Batch Mixer

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

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For That Rush Job

you must have an equipment that works ***quickly*** and ***well***—that saves money and labour. Do you want an immediate delivery of a mixer that will see you through your rush contract on time, do the best work always and economise right along the line? Then come and see the

Wettlaufer Improved Heartshape Mixer

It will help you to make yours a more profitable job

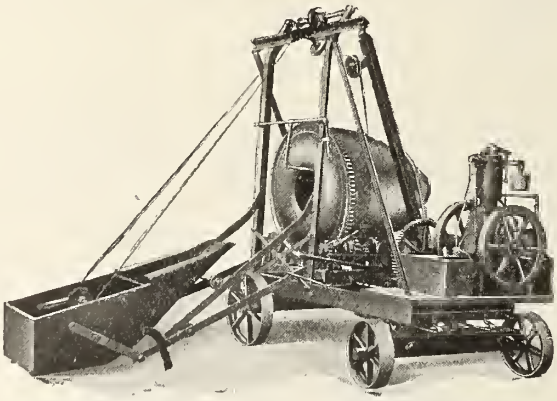
Strong Construction

Automatic Operation

Low Working Cost

Quick Loading

Clean Dumping



Wettlaufer No. 1 Heartshaped Mixer

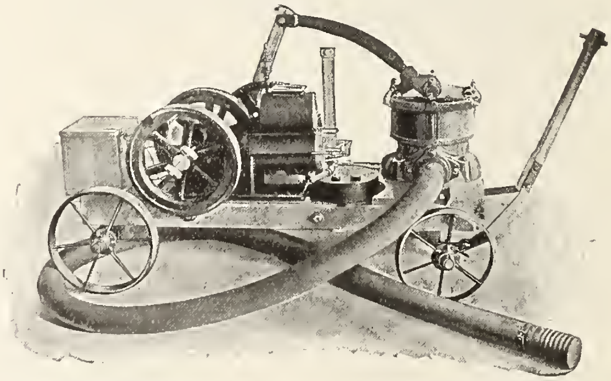
Rapid and Perfect Mixing

Increased Capacity

Minimum Repairs

Long Life

The Most Efficient Pump for Abutments and Foundations



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Capacity 2,000 gals per hour

Does the Work of Two Men

Full particulars and Catalogue on request. Continuous demonstrations at

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The most perfect system of concrete reinforcement on the market. Expanded Metal Cold Drawn—gives maximum stiffness, strength and high elastic limit.

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Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

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used by the

Building Trade

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WINNIPEG

Man.

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery. Send your orders for crushed stone to

ROGERS

French Caen Stone Cement

Monarque Brand and Cementaline. Rich in appearance and of unlimited durability, as good as natural stone—but cheaper. Full particulars of

ROGERS

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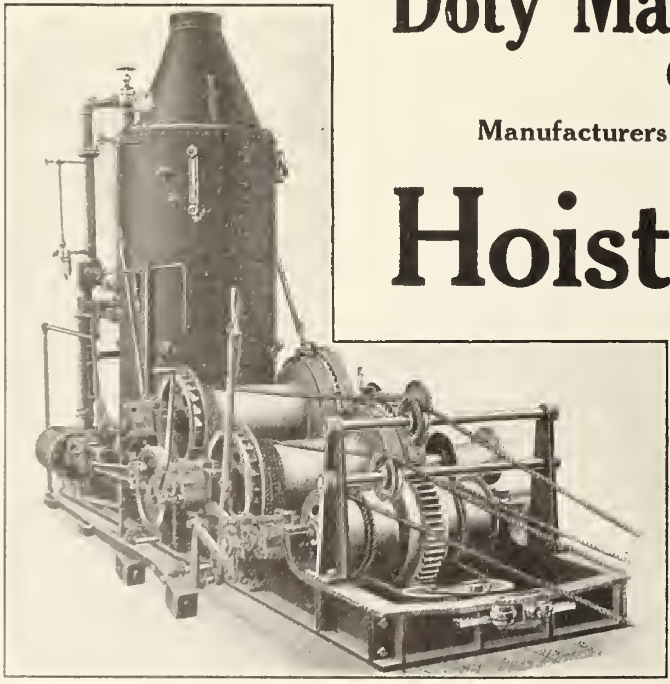
The

Doty Marine Engine & Boiler Company Limited

Manufacturers of **Superior**

Hoisting Engines



This cut illustrated our Standard Double Cylinder Double Drum Hoisting Engine with Derrick Swinger attached. "Superior to any other on the market." All parts constructed, guages and templates and every engine tested under steam.

Derrick Swingers, Material Elevators, etc.

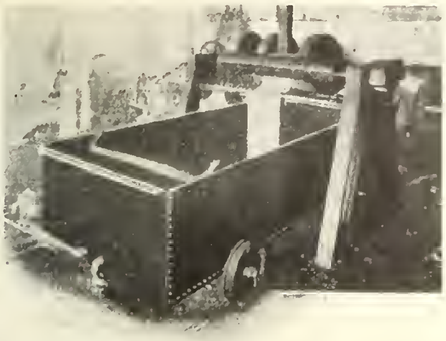
for

Contractors, Mines and Quarrymen

A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

Works— GODERICH, ONT.

To buy our Engines is a Guarantee of Satisfaction



SAWYER BELTS ARE WATERPROOF

SAWYER BELTS are immersed and saturated in a special compound which not only renders them impervious to the action of water, steam, oils and gases; unaffected by extreme heat or cold, but permits the retention of their natural elasticity and flexibility until the belts are entirely worn out.

SAWYER BELTING will not stiffen, crack, become hard, or stretch as much as leather or rubber belting.

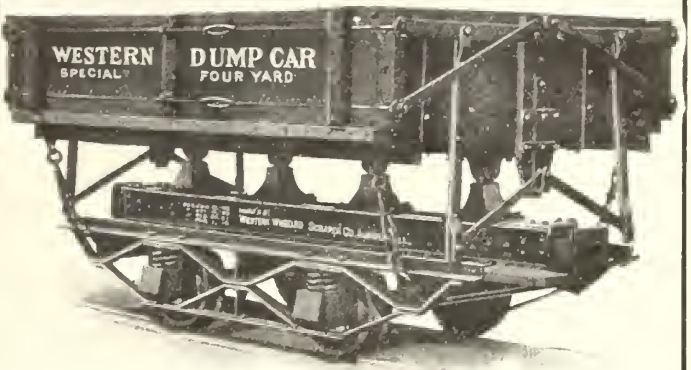
Write for Book No. 3

Sawyer Belting Company
CLEVELAND, OHIO

The Contractor's Dump Car Without a Blemish

with the ability to do the hardest service is the

Western Special 4-Yard Car



All castings malleable, beds supported by four heavy pedestals and hinges; 20" wheels; forged axles, M. . B. type with collars and dust guards; couplers broader and deeper, giving greater wearing surface and with yoke attachment; steel I-beam draft beam.

This car has also the celebrated Western features: pivotal doors, steep dumping angle, enabling it to be dumped easiest in shortest time, loose hinge construction, two springs over each journal, improved door construction. Not a detail neglected.

Our catalog describes the largest line of dump cars, earth and rock handling machinery made. Write for it.

Western Wheeled Scraper Company
Aurora - Illinois.

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS

1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

Total $376.17 or 5⅔c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.

Hagersville, Ont. Limited

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"PIONEER" Highest Quality ASPHALTS
TRADE MARK

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For Asphalt Macadam Roads, Asphaltic Concrete, Sheet Asphalt Paving—and Filler for Brick and Block Pavements

and results will be highly satisfactory. "PIONEER" ASPHALTS are 99.5 per cent. pure bitumen. They are waterproof and weatherproof. Can be used for all purposes where an asphalt can be used.

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Barrett Specification Roofs

On Four Great Granaries

TO cover the four huge granaries illustrated herewith the Canadian Pacific R. R. engineers chose Barrett Specification Roofs for good and sufficient reasons.

These practical men know that these roofs will last *20 years or more.*

They further know that they will need no painting or maintenance expense of any kind and that the net cost per year of service will be infinitely lower than could be shown by any other type of roofing.

It is for these very reasons that Barrett Specification Roofs are used on more first-class buildings in the United States and Canada than any other kind.

A big roof generally means a Barrett Specification Roof, for the reason that the cost of big roofs is carefully scrutinized and ultimate economy carefully considered. Small roof areas ought also to have Barrett Specification Roofs, because they are just as economical and satisfactory there.

Copy of the Barrett Specification with tracings ready for incorporation with building plans free on request. Address nearest office.

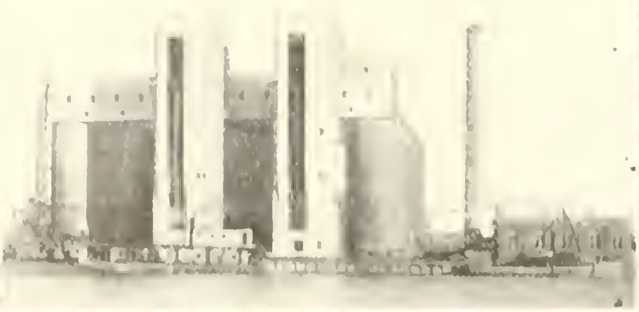
SPECIAL NOTE

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired however, the following is suggested: ROOFING Shall be a Barrett Specification Roof laid as directed in printed specification, revised August 15th, 1911, using the materials specified, and subject to the inspection requirement.

THE PATERSON MFG. CO., Limited

Montreal Toronto Winnipeg Vancouver St John, N. B. Halifax, N. S.



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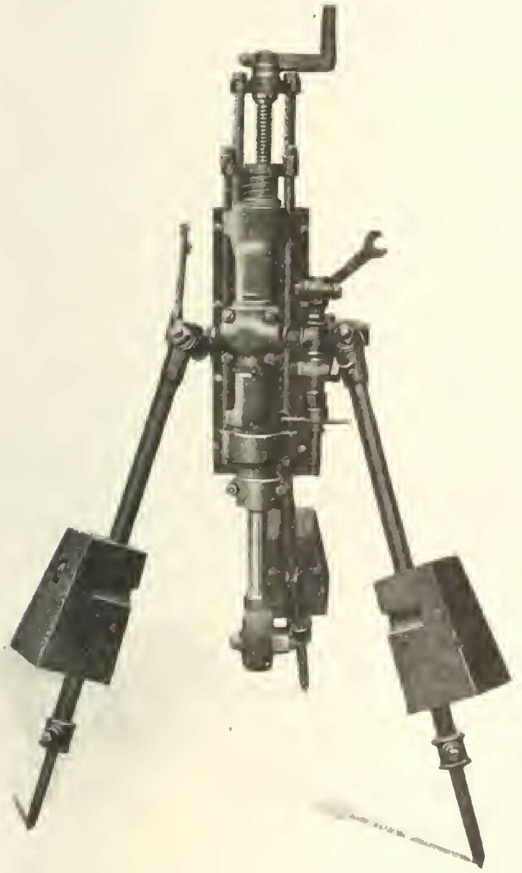

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In stock in Montreal and Napanee, and at work at places too numerous to mention here.

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NAPANEE :: ONTARIO

EFFICIENCY

In Water Meters

Means Just This:

Accuracy, uninterrupted service, without frequent and expensive repairs and the application of the right principles of construction and operation to specific needs.

Let us tell you something of the efficiency of our Water Meters and the various types which we manufacture

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Frost-Proof
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Meters

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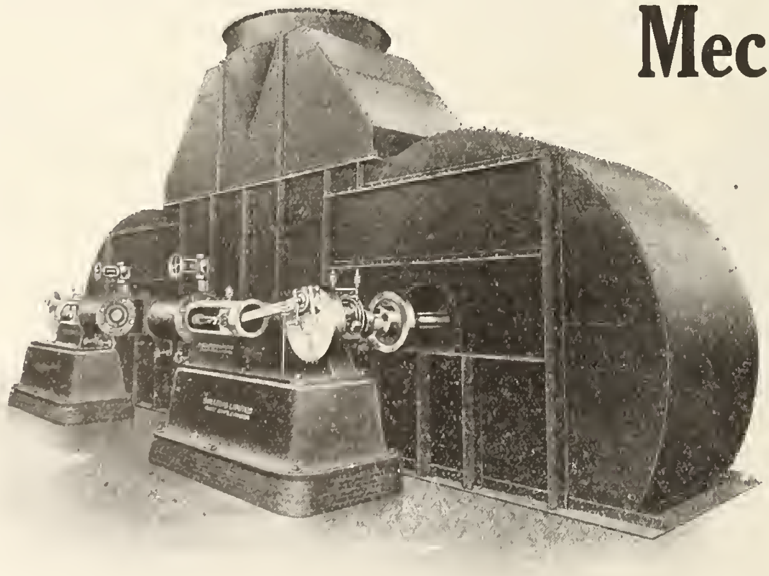

Mechanical Draft

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Smokeless Combustion
Higher Efficiency
Increased Capacity
Cheaper Fuel
Independence of Weather Conditions

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"TOXEMENT"
"CEMENT FILLER" and "CEMENT FLOOR PAINT"

TOCH BROTHERS
ESTABLISHED 1848

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For application to the inner surface of exterior brick or masonry walls, above grade level. Prevents the penetration of dampness. Saves the cost of furring and lathing.

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A chemical compound which, when mixed to the extent of 2 per cent. of the amount of Portland Cement used, will render cement or concrete construction absolutely waterproof against pressure. Is used for water-proofing floors, foundations, elevator and boiler pits, cement mortar troweled on the outside of rubble foundations, cement stucco, etc.

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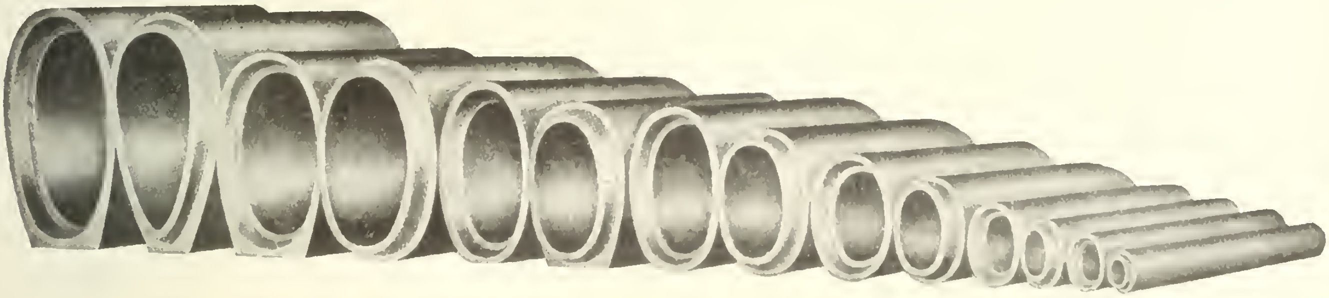

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properly built of properly made

- Reinforced Concrete Pipe -

LAST FOREVER.

OUR MATERIAL, SYSTEM and PRODUCT have been tested and approved by EMINENT ENGINEERS. NO RUST, NO ROT, NO FROST-BREAKS, NO PRESSURE-BREAKS, NO HIGH PRICES, NO DELAYS IN PROCURING, NO TROUBLE IN HANDLING.

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Patronize Experienced and Reputable Manufacturers.

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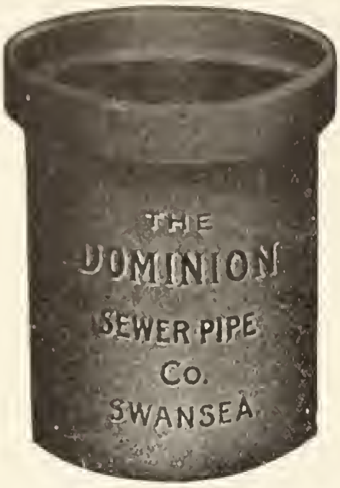

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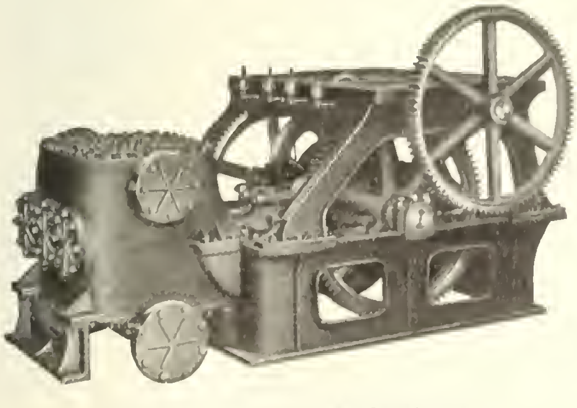

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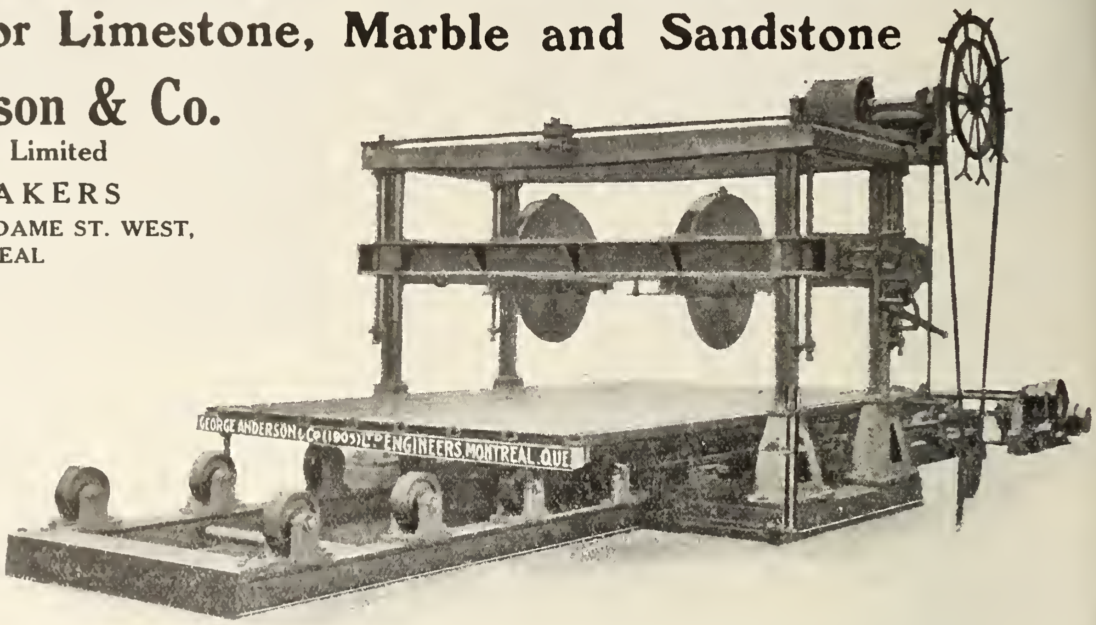

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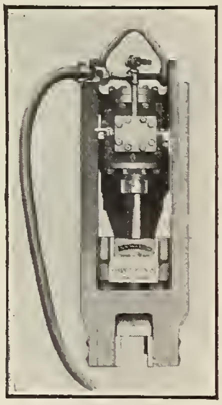

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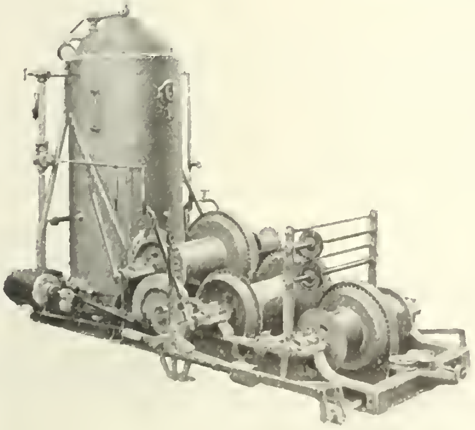

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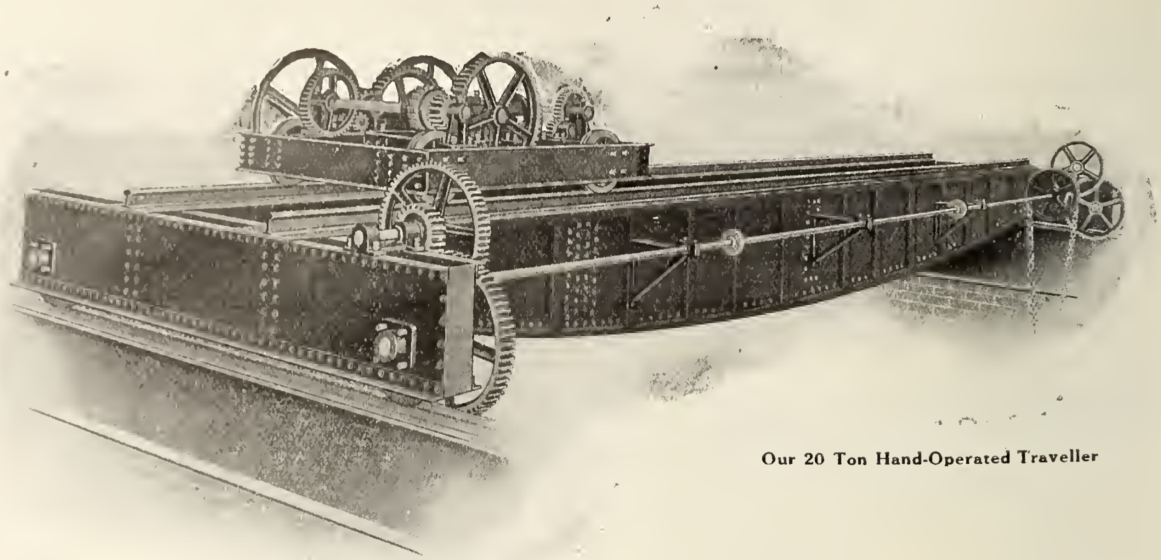

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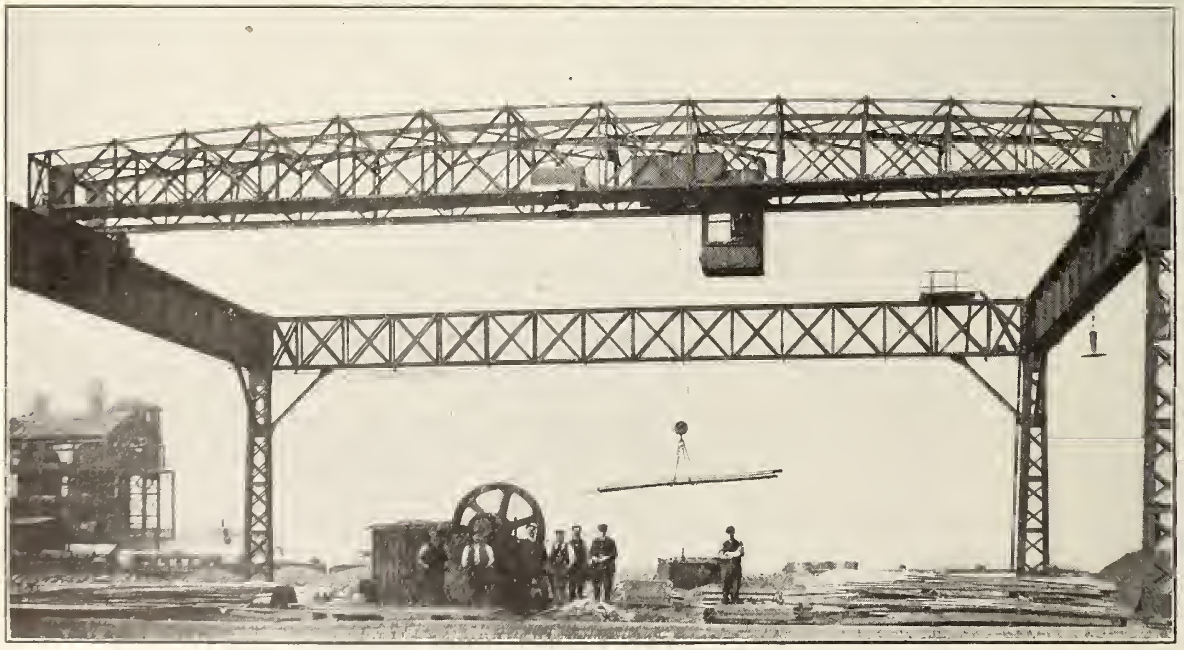

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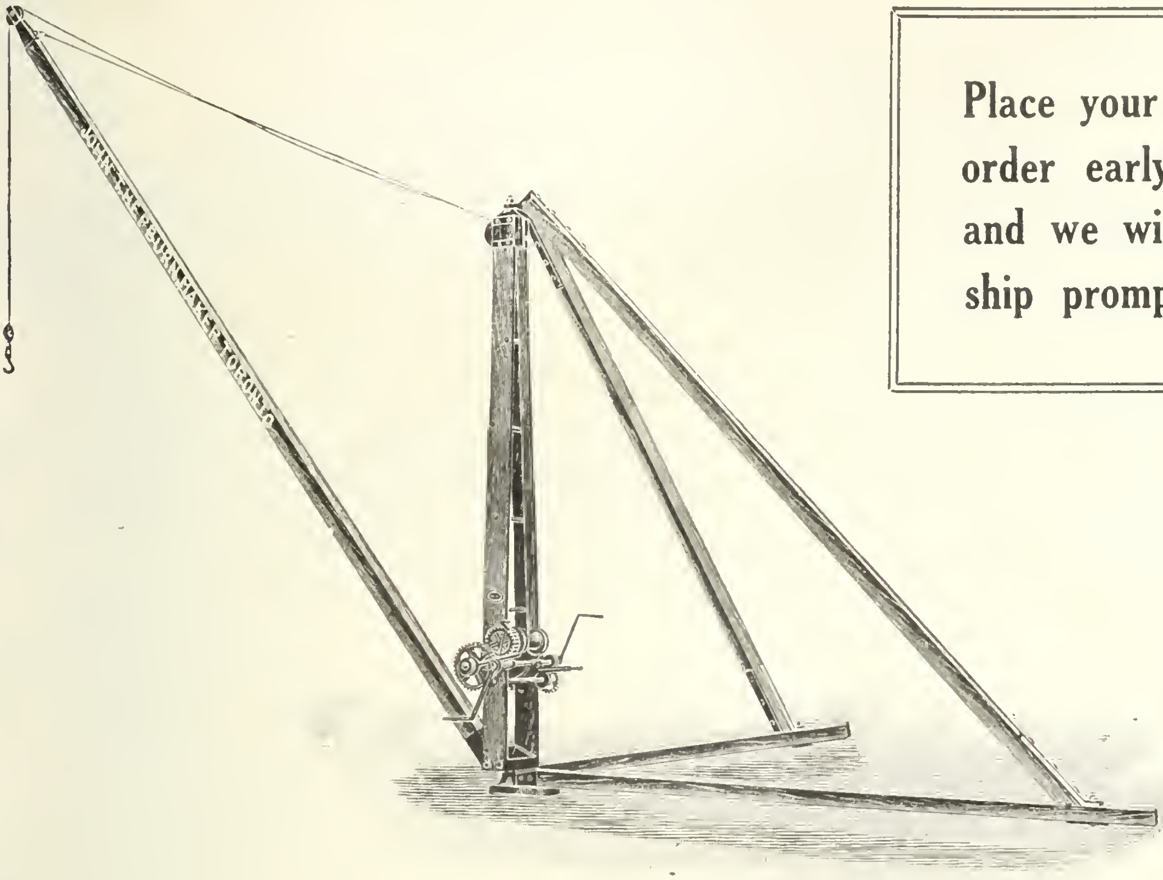
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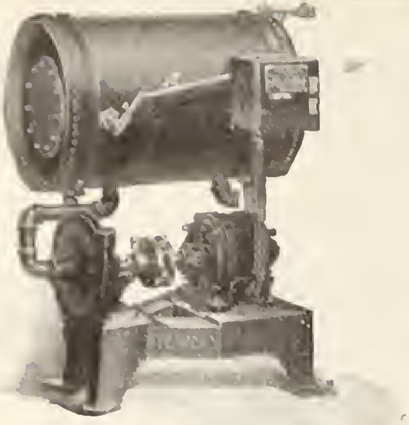

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Eliminates snapping and **cracking** in the radiators and pipes.

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Requires no attention other than occasional oiling.

Operates equally well on high or low pressure systems.

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Tell us your troubles and we will advise you how to overcome them.

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Solves the Concrete Pavement Problem

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A few years ago the first Dolarway Pavements were laid in Ann Arbor, Michigan, and the problem of satisfactory concrete pavements was solved. The solution was as simple as it is satisfactory.

Over the concrete was spread a thin layer of Dolarway bitumen. This made the ideal plastic surface, without which concrete pavements had not been entirely satisfactory The surface is not only inexpensive but its renewal costs very much less than the maintenance costs of any other form of pavement.

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The Dolarway method reduces the cost on permanent pavements 50 cents to $1.00 per square yard.

The pavement presents a handsome surface; it is quiet under traffic; no dust or mud is produced; no damage by oil drippings or thrusts of automobile wheels. It makes a most satisfactory cushion for horses.

Dolarway is good enough for city streets and cheap enough for country roads.

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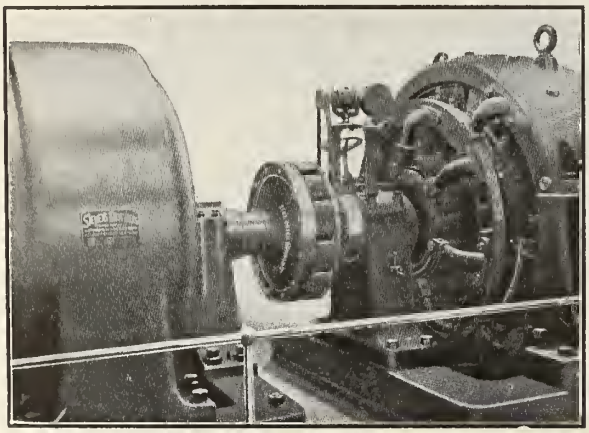

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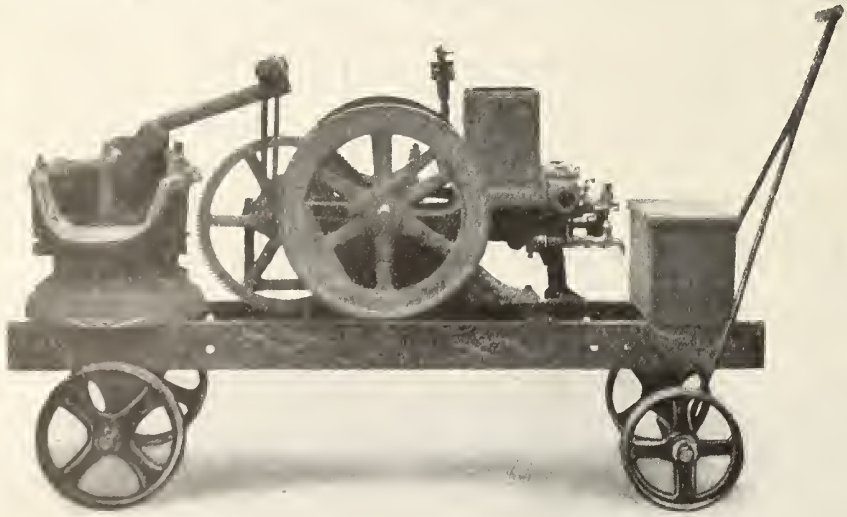

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750 " 60 " Angle Bars.
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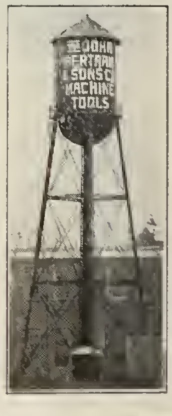

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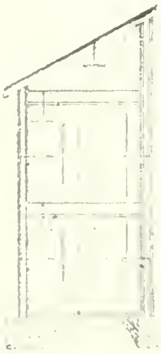

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is being used today on large excavating jobs. It does the work rapidly and with only a few men which means a low cost per yard. With the Brownhoist Drag Line Bucket the operator of the crane can dump the load at any point along the boom or the bucket will dump automatically at the end of the boom. The crane is shown here on the New York Barge Canal.

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Records show where the crane has been used day and night for months at a time without stopping for repairs. This appeals to contractors because loss of time is expensive.

We furnish this equipment up to 100 ft. booms and 3½-yd. bucket.

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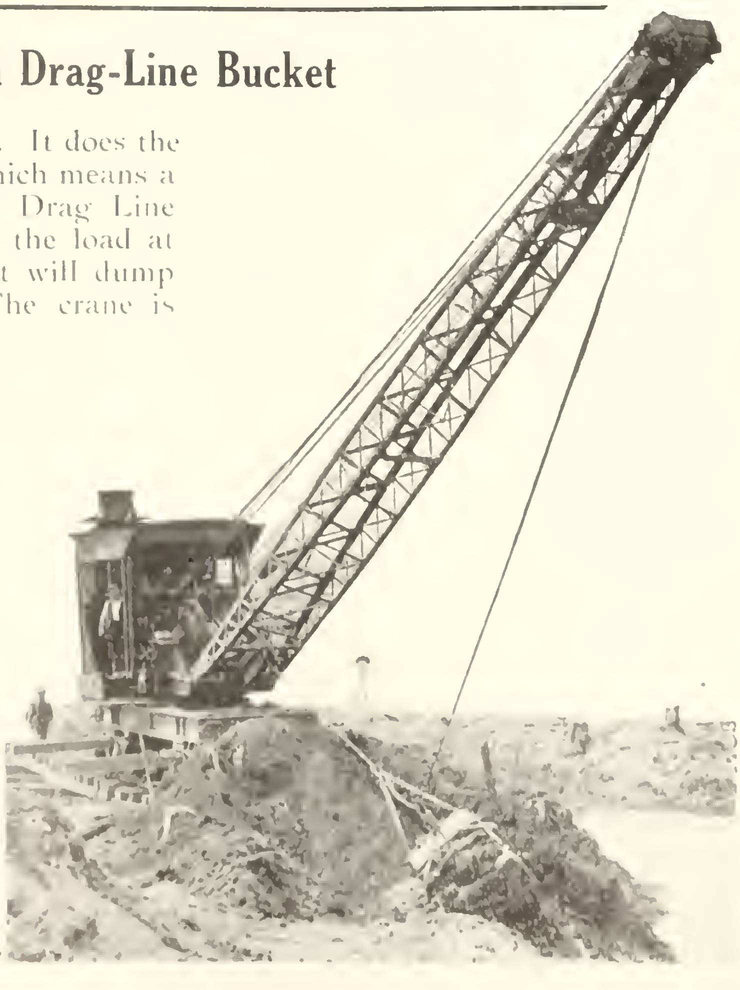

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This pavement was laid to secure a test of the wearing qualities of Wood Block.

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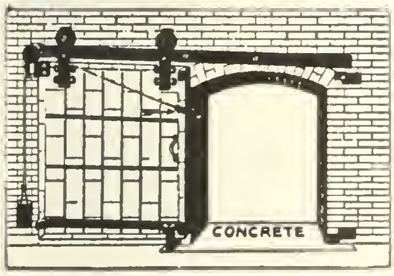

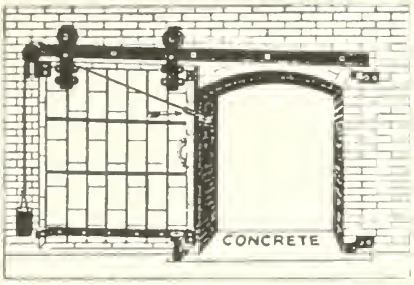

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Steel Castings
up to 20 tons in weight

A Belt Which Conveys ALL the Power

Practical men know the drainage of power from a slipping belt, *and because they know,* they are buying

GOODYEAR RUBBER BELTING

Which Neither Slips Nor Stretches

It is built up, layer upon layer, of close-woven, long-fibre, cotton fabric, rubberized and cured under Goodyear processes. And every Goodyear belt has in it the lowest possible minimum of stretch, because the belt is "cured" whilst stretched to the limit of safety in a special machine.

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And the result is entirely satisfactory to belt users—a fact to which our enormously increased sales testify. What is the significance of this CONTINUED SALES INCREASE—30% over last year? Simply that Goodyear Belting more than fulfills the claims made for it by the Goodyear people—who know what a belt should do, and make a belt to do it.

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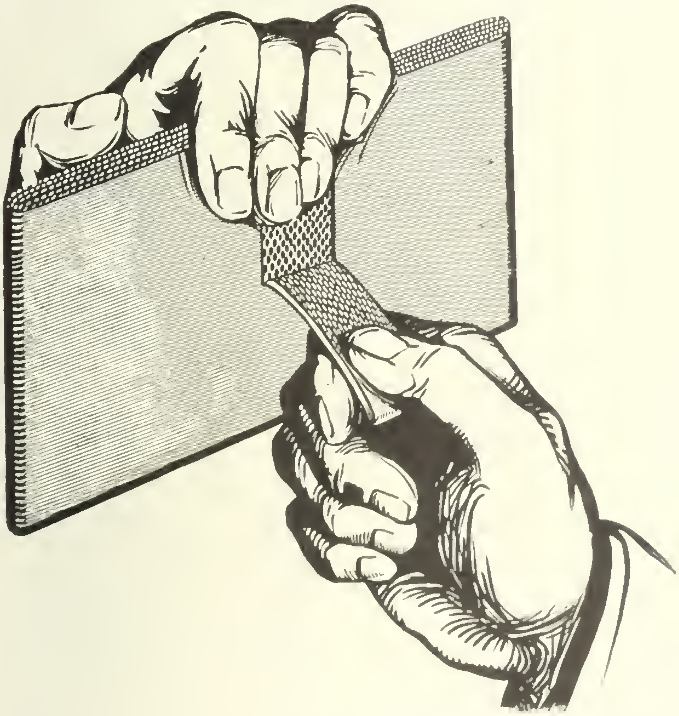

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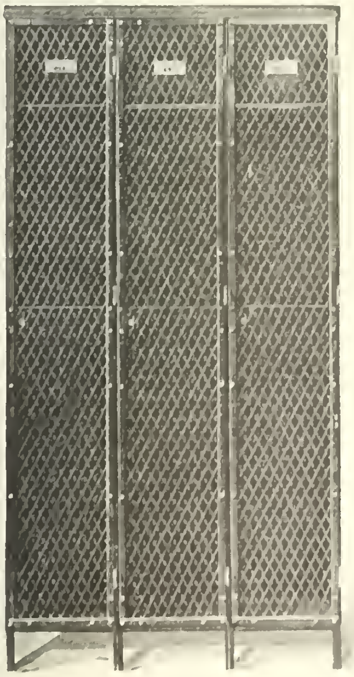

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Payment for Alteration of Plans

AT Ottawa there has arisen a rather interesting case which involves the general question of whether an architect, after having been given a commission to carry out a plan, is entitled to consider that he has a "free hand" within a reasonable meaning of the words, and if not whether he should be compensated for the work he may have already completed under instructions.

The case at Ottawa is between Mr. Francis C. Sullivan, architect, and the chairman and members of the Ottawa Separate School Board. Mr. Sullivan was instructed by the Board to prepare sketch plans for a new school building on Melrose avenue. These were completed by him, submitted to the Board and accepted, instructions being given him to proceed with the working drawings. When the drawings were placed upon the table, the Chairman of the Board, Mr Sims, changed the measurements completely, thus necessitating the preparation of a complete new set of drawings. Not content with this Mr. Sims subsequently changed his mind in favor of the original design.

Everything went well until Mr. Sullivan submitted his account, charging for both sets of drawings, which he was manifestly entitled to do. When the account was presented at a board meeting, however, Chairman Sims delivered a blustering speech in which he accused Mr. Sullivan of the perpetration of a daring fraud! Naturally, Mr Sullivan objected most strenuously to the allegation and his resentment has taken practical form in the filing of an action for libel

The result of the case will be watched with some interest. It is to be hoped that the outcome will be such as to afford a lesson to such men as the chairman of the Ottawa Separate School Board, who frequently exhibit not only the most appalling ignorance of technical matters but a failure to appreciate that professional men expect and are entitled to be treated with the dignity attached to their calling.

Apprentices or Rodmen?

CANADA seems to be unfortunate in the training of young men for the civil engineering profession, especially those who cannot afford a university course. These boys are taken into the offices of municipalities, railways or private concerns, and are classed as "rodmen," receiving a remuneration of about $40 a month. Their first duty is to hold the rod for one of the assistant engineers, and in the office they may be given some easy draughting work to do. But should their duties end there? What will these lads be able to do later on in life? Will they still be holding the rod—or what? Certainly if a boy be a particularly clever specimen and have a fairly decent chief, he may pick up the manner of using the level and transit, but boys of that type are few and far apart, and the ordinary youth has little chance of obtaining information, for every one seems to be too busy to think of helping the rodman to learn even the rudimentary principles of engineering.

Now would it not be far more satisfactory for these youths who cannot afford a university training, to serve an apprenticeship or pupilage with some engineering firm? Certainly, much more satisfactory results would accrue if they did, and Canada would have a better all-round class of good practical engineers at her command than she has now—better than she could ever hope to have under present conditions.

In Britain, a youth has to serve an apprenticeship or pupilage for a specified number of years—five years being about the average, although in many cases the term runs as high as seven years. The salary paid is certainly not very large, perhaps about $50 per annum, with yearly increases of $25. In some cases a fee of $500 per annum is charged for training an apprentice—especially in private firms—but the result is worth it, for generally, very highly trained engineers are turned out.

Usually the apprentice receives his practical training in "the shop," while at the same time he imbibes the theoretical side of the subject by attending engineering evening classes or by taking a technical college course. Scotland is excellently supplied with such classes and the embryo engineer receives the ideal training, viz., practical and theoretical, side by side.

How different this from the slip-shod system in vogue in Canada! Here it is a choice between going through an expensive college course, where the work is mainly theoretical, and entering an engineering office and gathering up such scraps of information as may perchance fall from the table of one's superiors.

Is it not time that the Canadian Society of Civil Engineers were taking some interest in this question, which is of such vital import to their future members? What is the Society intended for? What business do they transact at present? Surely, something more than the reading of papers should be accomplished! The active co-operation of the members of the C.S.C.E. is badly required in the training of Canada's future engineers

PROGRESS ON THE QUEBEC BRIDGE CONSTRUCTION

Special to the Contract Record and Engineering Review

AMONG the problems confronting the engineers and the contractors for the substructure of the Quebec bridge one of the most interesting, if not one of the most difficult, has been the joining of the two pneumatic caissons sunk to form the foundation for the north main pier. To state briefly the conditions which have been given at length in former articles in the Contract Record, the north and south main piers are to be identical to preserve the symmetry of the bridge. In 1910 an unsuccessful attempt was made to sink a caisson 180 feet long by 5 feet wide for the north main pier. Owing to the extremely hard material encountered, the unusual length of the caisson made it not only unwieldy, but more apt to damage from being unequally supported. The attempt was abandoned and it was finally agreed by the engineers of the Board in consultation with other foundation experts that the best way out of the difficulty would be to sink the large caisson on the south side, where the material was easier, and on the north side to sink two caissons which, together, should equal the first in size and bearing power. It was not considered advisable to sink two 90-foot caissons end to end as the sinking of one might undermine the other and cause unequal settlement. The scheme finally adopted was to build two caissons each 85 feet long and to sink them independently, leaving a ten-foot space between them, thus totalling 180 feet in length over all. These two were to be joined below low water and the masonry rising as one piece would give no hint of any difference from the south pier and at the same time would have a more than equal bearing, as the new caissons were designed to give a total of 180 by 60 feet, instead of 180 by 55.

The sinking of the two caissons was successfully carried out in 1911 as previously described in the Contract Record, but owing to an early winter the final joining had to be delayed until the spring of 1912.

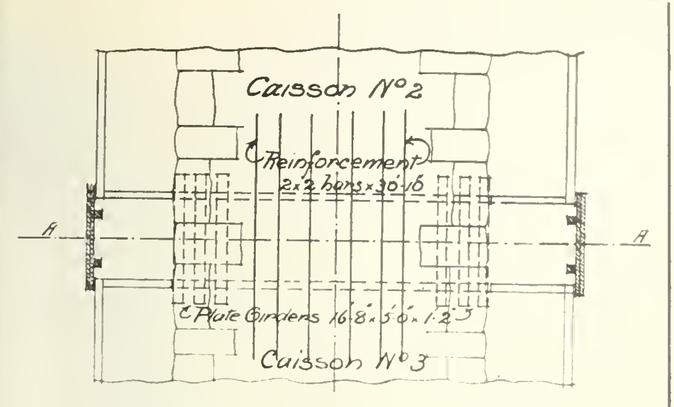
Several methods were suggested, including the familiar one of sinking a pneumatic caisson between the two which should be 10 feet wide and 60 feet long. The scheme finally adopted, however, and successfully carried out, was just as effective and much cheaper as it was accomplished without the use of compressed air and expensive "sand hog" labor. This plan was to construct an open cofferdam, using the two adjacent ends of the caissons already sunk as two sides, and to build two ends which should join on to the caissons thus closing the gap on the north and south sides.

When the two caissons were finally resting on bottom and their chamber concreted, accurate soundings and measurements were taken to find the exact surface of the ground between them, and also their relative positions. Two huge gates or shutters, 48 feet deep by 13 feet wide, were constructed. These gates were made of 12 in. x 12 in. longleaf yellow pine, bolted to two verticals also 12 in. x 12 in. Each shutter was carefully caulked and also fitted on the lower edges with a canvas flap, to make a better joint where attached to the caisson.

The bed of the river at either end of the gap was then dredged to the proper level by a clam-shell bucket operated by one of the derricks used for the concreting of the caissons. The shutters were then put in place and securely fastened to either caisson by means of 1 inch lag screens, 20 inches long. The under-water joint was effected by a diver, the bolts having been placed in the gates before they were lowered into position. The diver also folded over the canvas flap and attached it to each caisson to insure a better joint and hold the oakum in place. The gates, as shown

First course of granite between caissons

First course carried across the gap


Caisson No 2
Reinforcement 2x2 bars x 30'-6
A
A
Plate Girders 16'8" x 5'6" x 1.2"
Caisson No 3

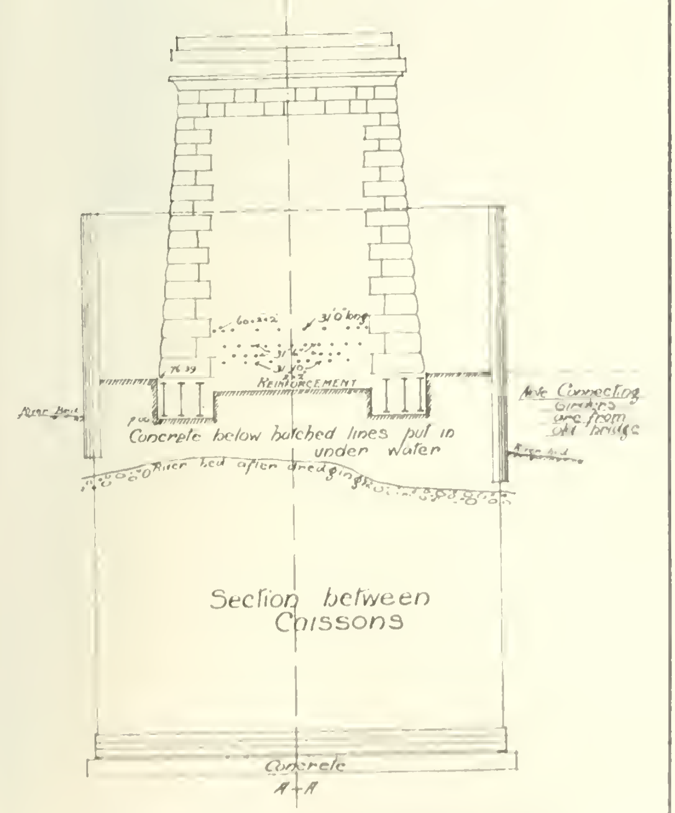
Plan showing gates forming new cofferdam

on the diagram, extended from elevations 56 to 102, level with the top of the caisson wall. They were also reinforced on the outside by two vertical posts of oak, 18 in. x 24, with cross struts of round timber, as a protection against the moving ice.

The walls of the cofferdam completed, the bottom was dredged approximately level to elevator 63 by means of the clam-shell bucket.

It was thus proposed to make a bottom to the dam by concrete deposited under water after which the dam could be pumped out, the caisson end walls cut through, and the joint effected by laying concrete in the dry up to the same level as in either caisson, elevation 77.0, the beginning of the granite masonry.

Several other considerations entered into the success of the plan. The first was to make a good joint between the concrete already laid in either caisson, with that to be placed between them. To effect this a bench was left in the concrete at the end of each caisson during the sinking. A large number of angles, 3½ x 3½ x ⅜-in. x 7-ft. long, with gusset plates attached, were embedded in the concrete and left sticking through the form into the gap in readiness to form a tie against shear when the new concrete should be laid.



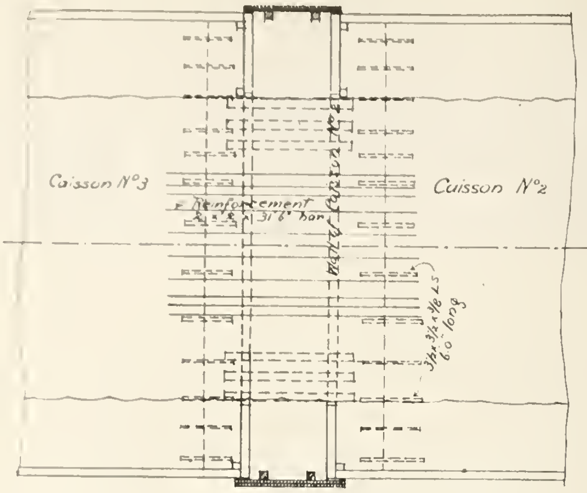
Section AA—Girder and rod reinforcement

To carry the masonry from one caisson to the other it was planned to place six girders, three on either side, directly beneath the granite facing of the pier. These girders were 17 ft. long and would project into each caisson about 4 ft. Together with the angles mentioned above they were part of the steel intended for the former bridge. The function of these girders was to prevent any cracking of the pier at the centre, should settlement take place in either caisson. In order that they might be of value it was necessary that they should be under elevation 77 and concreted into place in the dry. It was also necessary that a floor of concrete should be placed in the cofferdam, thick enough to resist the upward pressure of the 40-foot head of water at high tide when the dam should be pumped out. To get the required weight, using the minimum quantity of concrete, it was decided to bring the concrete higher in the middle of the pier and to reserve a space for the girders by building forms.

Connecting girders in place partly concreted

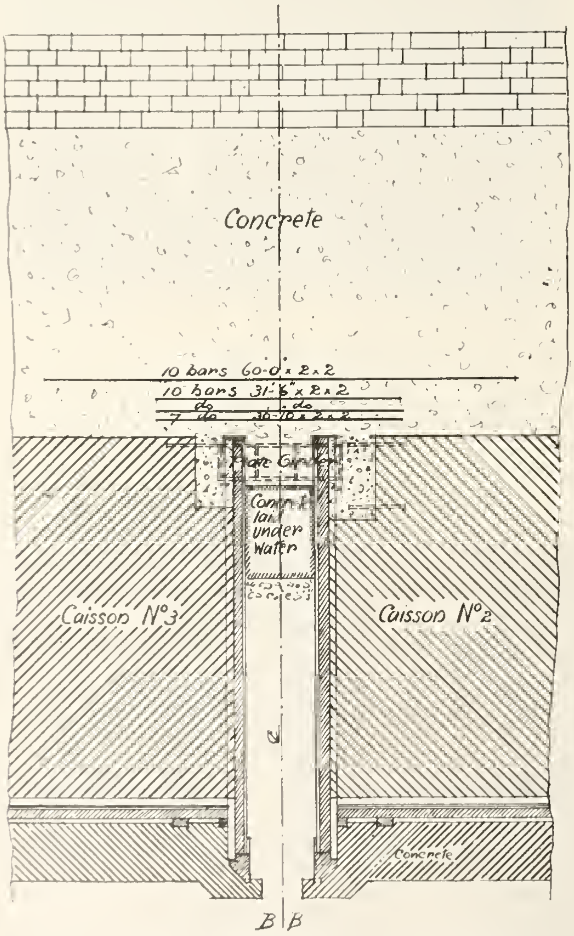
The laying of the concrete floor under water was done in November. The work was carried on continuously using Steubner bottom dump buckets which had been used in placing all the concrete in the caissons. They were lowered to the bottom of the excavation and the door was opened by means of a block and falls attached to the caisson, thus allowing the concrete to be placed without much disturbance, which would have caused separation of the cement from the aggregate.

The concrete was laid on the bed of the river, starting at elevation 63. When soundings showed that elevation 71 had been reached, the forms were put in, to save space for the girders. These forms were boxes, 18 ft. by 9 ft. and 8 ft. deep, with four uprights, 20 ft. long, 6 x 12. They were lowered into their proper places and the verticals were spiked to the



Plan showing reinforcing angles in benching

caisson walls. The concrete was then carried up to about elevation 77 between the boxes, and outside against the gates to about elevation 80 to provide a solid support to the gates against the water pressure and the ice. A large number of granite blocks weighing 8 to 10 tons each were piled on top of the surface of the concrete to prevent it being forced up by the water pressure. The work was abandoned at this point for the winter. Holes were left in the gates so that the water in the cofferdam could rise and fall with the tide.



Section BB—Connection of two caissons and method of reinforcing

When the ice was thawed out in the spring it was found that beyond need of a thorough caulking neither the gates nor the caissons had suffered damage during the winter. A 6-in. centrifugal pump was installed and the dam was pumped out. It was then seen that some concrete had fallen inside the forms meant for the girders. This had to be cut out before proceeding with the work. It was feared, however, that at these points, due to the thinner floor, the water pressure might break through, and, accordingly, a plan was devised to weight down the concrete and allow the cutting to proceed safely. Two trestles were made of four posts each, 12-in. x 12-in. x 20 ft. long, carrying a loading platform on top. These legs were stood on the concrete inside the boxes and loaded on top with about forty tons of granite each and the work of cutting out the concrete began. The trestles were only needed to guard against the pressure at high tide and were removed at low tide to allow the workmen more room. The forms were chopped out and the ends of the caissons sawn through, making one cofferdam 180 ft. x 60 ft. The concrete laid under water was found to be of good quality and very hard to cut. The cutting was done by hand with bullpoints, wedges and drills, no powder being used for fear of damage to the caissons. A layer of about six inches of "laitance," usually found in concrete laid under water, had to be removed and the surface of the concrete cleaned. The girders were then put in place, levelled up and concreted in, using a richer mixture than ordinarily.

Angle reinforcement

A large quantity of additional steel reinforcement was placed in the body of the pier in the concrete backing of the first three courses. Twenty-eight rods, 2-in. x 2-in. x 31-ft., were used and ten rods of the same section, 60 ft. long, were used, making a total cross section of 152 sq. inches of steel to resist tension and prevent cracking. Similar reinforcement will be placed near the top of the pier under the coping course.

The credit for the design and successful execution of this scheme is due to Mr. John D. Wilkins, C.E., resident engineer, and to Mr. Silas H. Woodard, M.A.S.C.E., engineer for the contractors, Messrs. M. P. & J. T. Davis.

Sewage Treatment vs. Sewage Purification

RECENT progress in the art of sewage treatment has been not so much in the direction of making sewage more nearly resemble drinking water as it has been in adjusting the treatment to particular needs, making the treated sewage fit for discharge into some particular stream or lake, taking into account the subsequent use of this water. The term "sewage purification" has been misleading to the layman and in a paper before the recent meeting of the American Public Health Association Mr. George C. Whipple, of New York, favored its abandonment in favor of "sewage treatment." The paper, which is given below, in abstract, dealt also with the relation of sewage treatment to water purification.

The general result of that notable series of experiments made a quarter of a century ago by the Massachusetts State Board of Health at Lawrence was that intermittent sand filtration was the method of treatment best suited to the local conditions of that state. Time has proved that this conclusion was correct. Intermittent sand filtration gives a relatively high degree of bacterial efficiency, but sandy soils of the proper character do not exist everywhere in the United States, so that this excellent method of sewage purification is much limited in its application. The need of processes to fit other conditions led to the use of improved screens, of chemical precipitation works, of septic tanks, of sprinkling filters, of contact beds, processes excellent in their way, but as ordinarily operated not capable of purifying the sewage to the same extent as the older method of treatment on land. Yet these miscellaneous processes all go popularly under the name of "sewage purification plants."

In a certain sense this is correct, for they contribute to the removal of the objectionable ingredients and living organisms in the sewage. The sanitary engineer, knowing the nature of the results, makes a proper mental discount of the term and is not deceived. The layman, however, takes the work "purification" at its face value and is deceived. How many times do we hear city officials proudly boast that the sewage of their city is in no way dangerous because it is purified in a septic tank?

There is an increasing tendency among sanitary engineers, Mr. Whipple states, to substitute for the term "sewage purification" the words "sewage treatment." Notably Mr. George W. Fuller has adopted this language in his recent admirable treatise on sewage disposal. The term "sewage treatment" does not imply complete purification and is therefore the more general and better term. The sewage of American cities, generally speaking, should not be "purified." To do so would be enormously expensive, and in most cases the results accomplished would not be commensurate with the cost. It should, however, be treated, as a general rule. The nature of the treatment required will vary all the way from a mere straining out of the grosser solids to a combination of processes that result in actual purification.

English Practice

In England practically all of the sewage is submitted to some process that improves its character, but these processes do not completely remove the organic matter and free the sewage of its dangerous bacteria. Analyses of the sewage effluents from the contact beds and sprinkling filters at Manchester and Salford show that during a large part of the time they fall below the standard of purity established by the Mersey and Irwell Joint Committee, a standard, Mr. Whipple believes, that cannot be regarded as too strick if we maintain a reasonable meaning of the word "pure."

The biennial report of Hugh Stowell, chief inspector for the Mersey and Irwell district, dated May, 1912, states that of 126 sewage works, 23 per cent. were non-efficient, this being an improvement over 34 per cent. as shown by his previous report. At Manchester 22 per cent. of the samples were below the established limit for organic matter of "one grain of oxygen absorbed per imperial gallon in four hours;" at Salford 12.8 per cent. of the samples were below standard. This is not intended as a criticism of English methods of treatment, which, on the whole, are well adapted to their particular needs, but merely to illustrate the danger of using loose phraseology.

Many laymen think that water supplies from lakes can be protected by purifying the sewage that enters them, and ardently advocate the construction of sewage purification plants and oppose water filtration. Would they say the same if they realized that most so-called sewage purification plants only partially remove the dangerous substances from the sewage, and that complete removal is impracticable on account of the expense and the almost insuperable difficulty of treating all of the sewage at times of storm? Would they not have a clearer conception of the problem if, instead of using the broad, misleading word "purification," we used the term "sewage treatment" or still better, some term that described definitely the results accomplished by the different processes?

Functions to Consider in Treatment of Sewage

In the treatment of sewage there are two very different functions to be considered. One is to get rid of the foul, putrescible matter with its accompanying offensive smell; the other is to get rid of living disease-producing organisms. One is very largely a physical and biochemical problem; the other is chiefly bacteriological. One does not directly concern the public health; the other may. In practice, these functions overlap, but they may be kept separately.

Is it not the popular conception of the function of sewage disposal plants that they are intended primarily to protect the public health? Is not this the theory upon which some of the recent legislation is based? It certainly appears so. But is this idea correct? Does the treatment of sewage by the ordinary process materially improve the public health? Are sewage works a success from a hygienic point of view? It is a vital question and one that has not been sufficiently considered from the standpoint of cost and result.

Sanitary history has shown that when polluted water supplies have been purified by filtration, the typhoid fever death rate of the community has lessened and the public health has otherwise materially improved. Taking the cost of efficient water purification at $10 per million gallons and allowing a per capita water consumption of 100 gal. per day, the process pays for itself if it reduces the typhoid fever death rate by 4 per 100,000.

No such record can be shown for the purification of sewage except perhaps in the case of a few plants built for the protection of the water supply of some large city, and even here it is difficult to measure the number of lives that have been saved. The purification plants that have been constructed for the large cities of the world have not the saving of many human lives to their credit, as far as the best available evidence shows. The reason is obvious. They have not, as a rule, been built for that purpose, popular ideas to the contrary notwithstanding.

Sanitarians abroad have long recognized the fact that river water supplies cannot be protected against the danger of infection by any of the known methods of purifying sewage discharged into the river above the waterworks intake. Instead, they depend upon the filtration of the water supply themselves. In Germany the filtration of surface water supplies is required by law and no difficulty has been found in building water filtration plants capable of purifying water after it has received what would be regarded in this country as a large amount of sewage. In Germany and in England sewage disposal works are built primarily to remove organic matter and prevent streams from becoming foul. Therefore, when public health authorities in this country compel large cities to construct sewage purification plants for the avowed purpose of protecting water supplies taken from rivers below them, they are attempting to accomplish the impracticable and are compelling the expenditure of money without adequate returns. The cost that can be expected in this direction is to lessen the burden placed upon the water filters and in some instances this may be desirable.

The pollution of water supplies is not the only thing involved in this matter. Sometimes it is a question of protecting shellfish supplies, or of bettering the sanitary condition of the water at bathing beaches. These may be fairly classed among the direct sanitary benefits of sewage treatment, but here the treatment to be of benefit must be quite complete and, therefore, expensive, while the number of lives saved in this way is probably small.

It would not be right to balance the cost of sewage purification against the saving of human lives, were it not for the fact that our cities are subject to debt limits and that money is needed for many other purposes that affect the public health, for cleaner streets, for better care of school-houses, for parks and play-grounds, and for the special needs of the Department of Health in securing safer milk and food supplies and for all sorts of hygiene and sanitary inspections. In view of the steadily increasing tax rates in our large cities, it behooves sanitarians to find out for each city in which direction money allotted to the saving of human lives will do the most good. In other words, how can the most lives be saved for a dollar? Whatever the answer may be, Mr. Whipple says, it is not likely to be found in the purification of sewage.

Appropriate Treatment

That the sewage of most American cities should be subjected to some form of treatment is conceded. The need will increase as our cities increase in size and number. The problem at hand is to determine the most appropriate treatment for each case, bearing in mind the results that can be accomplished, the peculiar conditions, the cost of construction, maintenance, depreciation and operation.

Processes of treatment perform one or more of these functions—clarification of the sewage, oxidation of the organic matter and removal of bacteria. The effect of the methods of treatment now available and in common use are given by Fuller in his treatise already referred to, as follows:

	Percentage Purification		
Method	Suspended Matter	Organic Matter	Bacteria
Fine screens (30 mesh or finer)	15	10	15
Sedimentation	65	30	65
Septic treatment	65	30	65
Chemical precipitation	85	50	85
Contact filters	85-90	65-70	80-85
Sprinkling filters	85-90	65-70	90-95
Intermittent sand filters	95-99	90-98	98-99

The figures for the last three forms of treatment are on the assumption that the sewage is given some form of preparatory treatment before it is applied to the filters, and that with the sprinkling filters the effluent is allowed to settle.

It is evident that some of the processes that are used primarily to prevent sewage from producing foul conditions, do also remove many bacteria and to the extent that they do this they improve the sanitary quality of the sewage treated. Often this can be accomplished at low cost, while to effect a reasonably complete and useful bacterial removal would add very greatly to the expense. This treatment of sewage to a less degree than that of complete sanitary purification may pay even though the direct hygienic aspects of the case be ignored, for whatever eliminates public nuisances adds to the comfort of the people at large, and tends to restore depreciated real estate values.

The above ideas, Mr. Whipple states, are not new to sanitary engineers; they know the limitations of the various methods of treatment; they know how well they work when kept in order, and how grievously they fail when not properly operated and enlarged as need requires; they are able to determine what methods or combination of methods are best suited to any case. Yet in common parlance and official reports they continue to say "sewage purification" when they mean something less. Perhaps a better term than "sewage treatment" can be found, but let us at least be more particular in the use of terms describing the processes discussed, lest the cause of sanitation suffer a reaction from the over-zealous interest of laymen based on false conceptions.

Application has been made for a patent for a collapsible stone measuring form for use on highways. It is customary in road building to dump the stone in unsightly piles at the side of the road. In building the state roads in New York this made it difficult for the state inspector to measure the stone. It was at his suggestion that the new device was adopted. It consists of a box with hinged corners which allows it to be folded up and placed on the top of the wagon-load of stone. The driver, when ready to dump his load, simply takes off the box, sets it up and dumps his load in. As the sides of the box are bevelled, when the form is removed it leaves the stone evenly piled. It holds just a half yard of stone, and the inspectors are not obliged to stop and estimate the quantity in each pile of stone but simply pass along the road and count the number of piles.

Water Purification Viewed from the Hygienic Standpoint[*]

THE progress in water purification from a hygienic standpoint has been very rapid in the last decade. This progress has been of two kinds. First, there has been a great increase in the number of water supplies that are being purified with satisfactory hygienic results; second, there has been an advance in the standards of efficiency, and in the methods available for reaching them in practical work.

Twenty years ago a considerable proportion of the largest cities of the United States were supplied with water polluted by sewage and notoriously injurious to health. At the present time this practice has mainly ceased. There are still a few of the larger cities that supply water that, in some respects, is not of as good quality as could be desired. But all of the larger cities that supplied notoriously bad water at the date mentioned have improved their supplies in one way or another, and in many or most cases filtered water of excellent quality is supplied at the present time. The smaller cities have followed in the same way, but more slowly. While there are some exceptions, a majority of them now have water of at least fair quality.

Advance in Filtration Methods

The advance in the methods of purifying water from a hygienic standpoint has not been less important than the increase in population supplied with purified water. Some years ago methods of water purification were in common use for treating highly polluted waters which secured the removal of bacteria to the extent of 97 and 99 per cent., and occasionally with well-built and well-operated plants, higher percentages up to 99.5 and even 99.9 were obtained. These figures relate either to all the bacteria in the raw water or to some portion thereof shown by the methods of examination commonly used. The presumption was that any injurious bacteria that there might be in the raw water would be and actually were removed in as great proportion as were the kinds that could be counted. This was always a matter of some uncertainty and there was reason for thinking, in some cases at least, that the removal of pathogenic bacteria may have been more complete than the removal of bacteria in general. However this may be, it is true that cities supplied with water drawn from highly polluted rivers purified by filtration to the extent above mentioned, were as free from diseases which could be attributed to the public water supply, as cities supplied with upland water of the best quality.

It was obvious that filtration was a relative and not an absolute protection against the impurities of the raw water. Some bacteria undoubtedly passed through the filters, and if pathogenic bacteria were present in the raw water a few of them might pass the filters and reach those who used the water. If a river had a population of 100 per square mile on its catchment area, and if the filter plant removed 99 per cent. of the bacteria, the water after filtration might be compared with water from a river otherwise similar, but with a population of one per square mile.

There was some indication that a falling off in bacterial efficiency had an appreciable effect upon the health of the community. There were notable cases where filters of inferior or inadequate construction or operated with less than the usual degree of skill, produced, temporarily or permanently, effluents inferior from a bacterial standpoint to those otherwise produced by the best filter plants; and there were cases where diarrhoea, typhoid fever and other indications of water pollution among those who used the water had followed such falling off in efficiency.

Skilful Operation of Filters

Skilful manipulation of filters must be regarded as equally important with good design in securing at all times an output of well-purified water. The best designed plants may produce poor or bad effluents with careless or unskilled manipulation, and skilful manipulation will do much to improve the average quality of the effluent from old plants not representing modern standards of construction. As the years have gone by, and the number of water purification plants has increased, there has been found a rapidly increasing number of men who have had experience and have acquired skill in operation; and the fact that such men have been available and have been secured to operate purification works has been a most important element in the improvement in the average results that have been secured.

It is more difficult to keep filters up to a high standard of efficiency during the cold weather of winter and early spring than at other times, and failures of this kind were most frequent at this season of the year. It was perhaps a fair inference that if the use of raw water caused a very great amount of disease among those who used it, and if poorly filtered water during the winter caused a slight, though perceptible increase in the same diseases that were caused by the raw water, that the smaller number of bacteria normally passing into the effluent might produce an effect upon the health of those using the water, even though this effect was too small to be measured by such vital statistics as could be obtained.

In the last years the practice of treating filter effluents, as well as raw waters, with hypochlorite of lime has become very common. Applied in very small amounts to clear waters that do not contain too much organic matter, it produces an extraordinary effect in killing bacteria. This substance had been used for many years as a disinfectant, but usually in much larger quantities. It was something of a discovery to find how efficient it was in extremely small doses in killing bacteria in water free from turbidity and organic matters. This condition certainly could not have been anticipated from earlier practice with it or from the literature on the subject.

Alternative Germicidal Treatments

Hypochlorite of lime is by no means the first or only substance that has been proposed and used experimentally, and applied in practice in a few installations for many years. Ozone has been tried repeatedly, but the practical difficulties of carrying out the ozone process effectively, and the great expense of doing it, have operated as obstacles to its general introduction. Hypochlorite of lime seems to have precisely the same bacterial effect as ozone, and it can be applied more easily and is free from some of the uncertainties that have been found adherent to the ozone process. Ozone has some advantages, and if means can be found for overcoming present difficulties its use will be another step in advance.

Sulphate of copper and other metallic salts have been proposed for killing bacteria as well as algae in water. It is permissible to use such a substance if it is applied to the raw water prior to filtration so as to secure a disinfecting action, and then have the metallic residue removed in the process of filtration. Some of these processes proved to have merit, especially in connection with filtration, but their use was always limited by the unwillingness of most of those in charge of water works to use metallic substances which were more or less poisonous.

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[*] Paper presented by Mr. Allen Hazen before the International Congress on Hygiene and Demography, Washington, D. C.

The use of hypochlorite of lime has practically superseded all such metallic substances, as it is more efficient and is quickly decomposed in the water into substances that are not poisonous, and within reasonable limits cannot be, by any possibility, injurious.

Other methods of killing the bacteria in filter effluents have been proposed, among which may be mentioned the use of the ultra-violet rays; but no plants for treating water in this way upon a practical scale have been installed in America, and the process is, therefore, one for future consideration rather than of established position.

Hypochlorite of lime has considerable power from a hygienic standpoint, even when applied to the raw water and without filtration. In this case a larger dose must be used and it frequently must be a variable one, because enough must be applied to furnish oxygen for organic and other matters in the water capable of rapid oxidation in its presence, and still leave a sufficient excess to perform its germicidal work. The amount required for the oxidation matters obviously depends upon the composition of the water, and this frequently fluctuates rapidly from day to day and even from hour to hour. The treatment of raw water has been less efficient and is less satisfactory than the treatment of filtered water, and has not infrequently resulted in occasional overdoses which have been objectionable in the water.

From a hygienic standpoint, the use of hypochlorite of lime is probably the most important event, after the extension of filtration works in the last decade, and where filtration is employed it permits the delivery of water in which bacteria have been removed uniformly and certainly to the extent of 99.9 per cent.

The use of this process has made it possible to deliver from filter plants of good construction water that is uniformly of excellent hygienic quality. There is no reason to believe that any appreciable danger will result from the use of such water, even when drawn from the most highly polluted sources that are now in use for public water supplies.

With the great extension of filter plants and the development and use of these supplementary processes, the time is rapidly approaching, and has, in fact been reached for a large part of the urban population of the country, when public water supplies cease to be agents for the transmission of disease. On the other hand, many experiences in widely separated cities should teach that constant care is the price of safety, and that every reasonable effort must be made to prevent the occurrence of any condition that would interrupt, even temporarily, the efficiency of the processes that are relied on for safety.

Sewage Purification

The processes that have been successfully applied for the removal of bacteria from water may be applied with modifications adapting them to the change in conditions, to removing bacteria from sewage. There has been a renewed effort under the stimulus of these new methods, to secure the disinfection of all sewage to be discharged into rivers and lakes from which public water supplies are taken. This impulse represents a most commendable interest in public water supplies and a desire to protect them from pollution.

It must be recognized, however, that it is more difficult and expensive to remove bacteria from sewage than from drinking water, and the process, even under the most carefully controlled conditions, is at the present time far less certain in its operation when applied to sewage.

The question of the combined or separate system in sewers, the treatment of storm overflows and the treatment of street washings discharged by drains which do not carry sewage, all have to be considered in connection with this general question.

Up to the present time improvement in public water supplies has come almost entirely through methods of improving the water used. Improvement of water supplies by purifying the sewage that flows into the water from which they are taken has played hardly an appreciable part in the improvement of water supplies in America.

Looking at the matter broadly, these conditions must be expected to continue for the present, and further improvement in water supplies is to be expected from improvements in methods of purifying the water, and from increased care and faithfulness in carrying them out rather than from the more extended use of sewage purification.

Use of Explosives in Road Construction

In a great many ways the construction of roads is similar to that of railroad building, but it is seldom necessary to make as deep cuts and perform as heavy work as has to be often done to obtain the proper grade for the operation of railroads. The heavy equipment, such as steam shovels, light locomotives, cars, etc., necessary on most railroad work, are seldom required for the construction of good wagon roads, although steam shovels of lighter type are used extensively. Where the ground to be excavated is soft, the same explosives can be used as for railroad grading, but it is very rare that deep tight cuts through rock have to be made in the construction of highways. Therefore, for rock work in road building it is seldom necessary to use the high-grade dynamites which are commonly required in tight railroad cuts.

For rock in highway construction, the low freezing dynamites are probably the best adapted. Where a strong, smashing action is desired the nitroglycerin grades can be used, and where more of a spreading and heaving effect is necessary the extra grades will give the best results.

Railroad powder can be considered the connecting link between blasting powder and the low-grade dynamites. It consists of a crude blasting powder with the admixture of five per cent. of nitroglycerin. On certain special kinds of work it is the most economical. It is particularly adapted for blasting in soft, seamy rock where dynamite would lose a large part of its strength by a local shattering around the charge, and blasting powder would lose a great deal of its effectiveness by the gases blowing out through the seams. Railroad powder freezes and becomes lumpy at temperatures between 45 and 50 degrees Fahr., but it can be relied upon to do good work at low temperatures, provided the lumps are crumbled before loading.

Blasting powder is best adopted for use in soft rock, hardpan, clay, etc., where it is desired to shake up large amounts of material for easy shoveling. Blasting powder exerts a strong push on the ground to be moved instead of a blow such as is delivered by the explosion of dynamite.

In rock work, where the drilling is done by hand, up to ten feet seems to be the best depth of hole. The burden in front of the holes should always be a little less than their depths. An effectively placed charge can be obtained by springing the holes before loading. This is done by exploding a couple of cartridges of dynamite in the bottom. If the cavity produced is not big enough, repeat the operation, using larger charges, until the chamber is of a size that will accommodate the entire charge. Sufficient time should be allowed between the firing of charges and reloading for the hole to cool completely, otherwise there is danger of an accidental explosion.

In clay, hardpan and soft rock, blasting powder is the most economical. The strong heaving and spreading action from this explosive is the most effective in soft material, provided there be no seams present of sufficient size to allow the escape of the gases from the explosive. In this work it is best not to give the holes greater burdens than from 12 to 15 feet, and never more than the actual depth of the hole. The best results from blasting powder are obtained by concentrating the charge in the chamber sprung to receive it at the bottom of the hole. This also allows the use of more tamping, giving better confinement.

The best method of firing charges of blasting powder is to make a primer of a cartridge of dynamite and an electric fuse. The detonation of the dynamite cartridge causes the blasting powder to explode with more violence. If a line of holes charged with blasting powder and primed in this manner is exploded at one time, the ground is broken up in much better shape for handling than it would be if the holes were fired singly.

Frequently on side hill cuts it is desirable to waste the material blasted. If the hill slope is steep and the material is rock, it is often economical to load all the holes very heavy so that when the blast is fired as much material as possible is thrown clear of the grade. If the slope is flat this would probably mean that the material would have to be thrown too high and far, making the explosives cost too high.

In soft material the wasting method of blasting is liable to be entirely impractical, because with excessive charges in soft material there is a great loss of effective strength due to local shattering and compression around the charge.

For mudcapping large boulders, 40 per cent. or 60 per cent. nitroglycerin dynamite will probably give the best results. Only the hardest boulders will require the 60 per cent. If they are very numerous it will probably be cheaper to put some men at work drilling plug holes in them for blasting. In mudcapping care should be taken to press the explosive down closely on the rock so as to exclude all air spaces. For the same reason the mud covering of the explosive should also be packed down firmly. Whether it is more economical to use the rapid mudcapping method for breaking boulders or the slower method of drilling, will have to be determined by the foreman on each piece of work. There is no general rule in regard to breaking boulders than can be made to apply to all classes of work.

For firing blasts of the grade work proper, the electrical method is by far the best and safest. When the line of holes is blasted by electricity more work is accomplished and the ground is broken out clearer than if the holes are shot singly. Also with electric blasting the shot is not exploded until everybody is at a safe distance and there are no hang fires of burnt holes that might be causes by the use of cheap, damaged or defective fuse.

The use of strong detonators is most strongly recommended. It has been proven by actual experiment that when strong blasting caps and electric fuses are used the force of the explosive is stronger and more violent. As a result of this all the principal manufacturers of explosives in the United States recommend the use of nothing weaker than No. 6 detonator. In most of the European countries the use of anything weaker than a No. 6 detonator is prohibited by law. In the cities or any place in close proximity to buildings, where there is danger of damage due to projected material, the holes should be spaced close together and light charges used. In this work the blasting should always be done by electricity. In order to prevent the projection of blasting material, mats made of wire rope placed over the holes and face are very effective. When using these it is best to lay a covering of logs directly over the blast and the mat on top of these. This lengthens the life of the mat very materially. If blasting is done by caps and fuse it is possible for one of these shots to disarrange the protective covering in such a manner that one of the subsequent blasts may throw the material in such a manner as to cause damage to outside property. For this reason, in closely populated sections, where it is necessary to cover the blasts, only electric method of blasting should be used.—The Contractor.

A floating bridge across the Hoogly River to replace an existing pontoon bridge and connect the cities of Calcutta and Howrah, India, has been designed by Sir Bradford Leslie and submitted in competition to the Calcutta Port Commissioners. One of the conditions to be complied with is the elimination of piers in the river-bed because of their possibly injurious effect on the channels of the port. The proposed bridge is divided into three sections, a central draw span and two short side sections, supported on grouped pontoons and two end trusses, forming adjusting ways to allow for variations in the level of the river. The length of the central section is 458 ft. and each of the adjusting ways measures 468 ft. Ninety per cent. of the weight of the bridge is carried by submerged pontoons. There are four grouped pontoons on each side of the 200-ft. central draw span; each pontoon is 239 ft long, 25 ft. wide and 8 ft. 6 in. deep, and is fitted with bulkheads. The pontoons are moored in place by 48 stud link chain cables, $2\frac{1}{4}$ in. in diameter, fixed on the up and down stream sides. The main pontoons are protected by fender pontoons.

A fine example of concrete bridge construction on a large scale has been completed at Spokane, Washington. The bridge is 781 feet long by 68 feet wide and includes three arches, of which the middle one has the span of 281 feet, and the clear height of 130 feet above the water.

English Practice in Repairing Old Brick Sewers

MANY of the brick sewers, constructed in England 40 and 50 years ago, have in recent years become defective, thereby necessitating considerable repair or reconstruction. Two examples of recent practice in repairing sewers of this character were described by Mr. O. E. Winter, Borough Engineer of Hampstead, England, in a recent paper before the Institution of Municipal and County Engineers. The paper also describes the present practice of Hampstead in flushing and otherwise cleansing sewers of large sizes. An abstract of the paper is here given:

The chief defects of old brick sewers are generally in the invert—which has been mostly constructed in brickwork or cement blocks. This has become worn, with settlements in places. The side walls and arch of sewer have been built of good hard bricks, but with wide joints, in lime, and often burnt ballast mortar. The brickwork has consequently become uneven, with rough surface, and impossible to keep in clean condition. The brick sewers are egg-shaped, the usual sizes being 3 ft. 9 ins. by 2 ft. 3 ins. and 3 ft. by 2 ft. In many cases these sewers are much larger than required, and where extensive repairs are required it is necessary to decide, first, as to the advisability of reducing the size of the sewer and reconstructing in a glazed stoneware pipe sewer of sufficient size to be self-cleansing, or, second, of carrying out repairs and renewals to the old sewer if material reduction in size is impracticable.

A good and somewhat unusual example of the first method is a reconstruction which has been carried out to a 3-ft. by 2-ft. brick sewer in Hampstead. This sewer was constructed 47 years ago, and it is stated that considerable difficulties attended its construction, owing to the running sand and water. The side walls and arch in places were being pressed in, and water and sand were being forced through the rough joints of the brickwork by the outer pressure. There appeared to be serious risk of the collapse of the sewer. After careful consideration and experiment the author devised the construction of a 15-in. pipe sewer within the old 3-ft. by 2-ft. sewer, and filling around the new pipe solidly with concrete. See Fig. 1. Although the space available for working in the old sewer was very confined the work has been carried out and completed in a sound and watertight manner, working from the existing manholes and the shafts for the new manholes it was desirable to construct. Otherwise, any further opening in the difficult ground was avoided.

The stoneware pipe adopted for the work was the grouted composite jointed pipe manufactured by Messrs. Doulton & Company, of London. It was necessary that a joint should be used which could be easily and quickly made in running water, and thus avoid any diversion of the running sewage. On inserting the spigot into the socket, the composition rings (which are previously greased) at once form a sound joint. See Fig. 2. The attached canvas casing (or bag) allows the cement joint to be easily made. When the cement grout is poured into the canvas casing, any water within the casing is driven out through the canvas by the heavier grout, and a perfect joint is secured.

In laying the new pipes it was desirable that they should be laid to a true gradient between manholes. As the old sewer had settlements in places it required considerable care in fixing the new levels. This was done in the following manner: The level of the new invert was fixed at each manhole; then 2-in. by ¾-in. wooden battens were fixed on each of the side walls, at the required level, by a line from manhole to manhole. Gage is then worked from the under side of the batten to the invert of the pipe, and the pipelayers can easily work to a true line, whatever the gradient may be.

Periodically, when the flow of sewage was at the maximum, the sewage was dammed back, and the test of 25 ft. to 35 ft. head was applied to lengths of pipes laid varying from 20 ft. to 30 ft. These tests showed that the joints were quite watertight, notwithstanding that the pipes were laid in water varying from one-third to three-quarters the diameter of the pipe. After the test mentioned, the whole space between the pipes and the old brickwork was filled in with cement concrete. The length of sewer dealt with in this manner was 2,806 ft. An excellent self-cleansing sewer has thus been obtained in substitution for a defective and offensive brick sewer, for about one-fourth the cost of the original sewer. The actual cost of the 15-in. pipe sewer work alone, including filling into the old 3-ft. by 2-ft. sewer worked out at about $2.88 per lin. ft., complete. The same method has been adopted with other defective brick sewers, the same jointed pipe being used in each case as last described, but of the diameter to meet the needs of each case. The following particulars may be given of these:

Size of old sewer	Diam. of new pipe	Cost per foot run complete
3 ft. 9 ins. x 2 ft. 6 ins.	9 ins.	$2.40
3 ft. 6 ins. x 2 ft. 3 ins.	12 ins.	$2.10

The following data may be useful in connection with this work: 15-in. stoneware pipe in 3-ft. by 2-ft. sewer; one pipe-layer and three laborers laid and completed, including concrete filling, on an average 5 ft. per day; 12-in. stoneware pipe in 3-ft. 6-in. by 2-ft. 3-in. sewer; one pipe-layer and three laborers laid and completed on an average 9 ft. per day; 9-in. stoneware pipe in 4-ft. by 2-ft. 8-in. sewer; one pipe-layer and three laborers laid and completed on an average 12½ ft. per day.

In cases of old brick sewers, where it has not been practicable to reduce to much extent the size of the sewer as last described, a different method must be adopted. As already stated, the chief defects to be remedied were in the invert. But the brick inverts are not generally so defective as to require entire under-pinning, nor the complete removal of the inner ring. To meet such cases, the author designed a reinforced concrete invert, to fit the existing invert of the sewer. The invert was made to the section shown in Fig. 3, 2 ins. in thickness, and in lengths of 2 ft., with rebated joint. Of this size they could be readily handled and got into the sewer through the existing manholes or side-entrances. The inverts are usually stored three or four months to permit them to thoroughly harden before being sent to the works. The concrete inverts were bedded and jointed in cement mortar, and where any depressions existed in the old invert, or more regular falls could be obtained on fine cement concrete. To firmly secure the inverts in position, over each joint a corbel, 4½ ins. by 6 ins. by 2¾ ins. was pinned into the side walls of the sewer. A cement benching was formed on the top of the invert, enclosing the corbels, and making one finished continuous line. The inverts were lowered into the sewer in a rough frame to prevent damage, and placed on a specially made trolley, and covered to the point required. The reinforcement consisted of steel wires.

During the time the inverts were being fixed in position the sewer was dammed up, and the flow conducted along the side walls in galvanized iron troughs, arranged sufficiently low to receive the drainage from the house connections. Several thousand feet run of this invert has now been fixed in such old brick sewers as described, with very satisfactory results. The cost of the new invert, including bedding and laying complete, averages from 96 cts. to $1 per lin. ft. This is a much lower cost than would have been incurred in cutting out 4½ ins. of the defective brick invert, and renewing in brickwork. The sides and crown of the sewer were scraped and thoroughly washed, the joints of sidewalls raked out about 1½ ins. deep, and filled in and repointed with cement and sand mortar (1 and 1). In a 3-ft. 9-in. by 2-ft. 3-in. sewer the cost of this work varied from 48 cts. to 72 cts. per lin. ft. of sewer, according to the amount of defective brick work requiring to be cut out and made good. The total cost, therefore, of putting these old sewers into a thoroughly good and sound state of repair did not exceed $1.44 to $1.68 per lin. ft. Good, clean, sanitary conditions have thus been obtained at a comparatively small expenditure. After these works have been completed there has been a very marked improvement in the air within the sewers, which cannot fail to have an important beneficial effect on the general sanitary condition of the neighborhood.

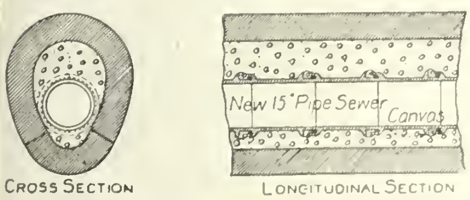


Fig. 1—Example of repairing old brick sewer, originally too large, by inserting a pipe sewer encased in concrete.

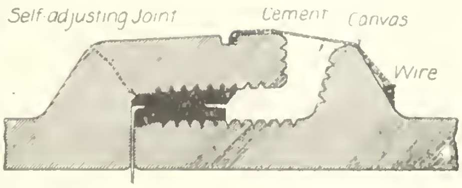


Fig. 2 Detail of the Doulton "grouted composite" joint for pipe sewers in wet trenches.

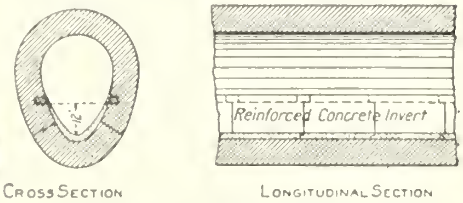


Fig. 3- Example of repairing old brick sewer by laying new invert of reinforced blocks.

Flushing and Cleansing

Regular and systematic flushing of sewers is of great importance, and absolutely necessary in keeping the sewers in a clean condition and free from nuisance. For this work in Hampstead the borough is divided into three districts, and six men are regularly engaged—two in each district. There are 42 flushing tanks constructed underground, with a capacity of about 2,000 gals., which are discharged at least once a week. Water is supplied through a meter. These tanks are arranged at such points that they can flush two, three, or more sewers by means of flaps. The flushers who attend to their working also clean out the surface ventilators, and see that all inlet gratings in their respective districts are free from obstruction, and report any defects. Flushing manholes are also arranged at the apices of other lengths of sewers, and are flushed out from time to time as circumstances require by a steam motor watering and flushing van of 1,000 gals. capacity. This van has proved very efficient for the purpose. A gang of not less than three men traverse all the brick sewers for the purpose of removing any deposits. They also see that the flaps to house drains are working freely.

Where large brick sewers exist, and especially where such sewers are only at long intervals fully charged in times of exceptional rainfall, it is desirable that further cleansing should be carried out in addition to the regular flushing. The author's attention was called to this very forcibly in a report on sewer ventilation made to the Hampstead Borough Council in 1905 by Dr. F. W. Andrewes and Dr. W. H. Hurtley, after a careful examination of the older brick sewers. They state:

"It is probable that much, if not all, of the smell arising from the ventilating grids depends not on emanations from the flowing sewage, but on decomposing organic matter and fungoid growths on the walls of the sewers, which are in some places in an exceedingly filthy condition. We are informed that when the men employed in the sewers had to work for any length of time in one place, they did, of their own accord, wash down the walls for some distance from where they were working, and that this expedient considerably reduced the offensiveness of the air. We therefore recommend that where nuisance arises from the sewer grids the walls of the whole sewer in question should be thoroughly washed and cleaned and finally rinsed over and otherwise treated with a disinfectant. Should it be found, on trial, that the nuisance can thus be abated, the cleansing should be carried out as far as possible throughout the district, attention being especially paid to the older brick sewers."

For the purpose of thoroughly cleansing brick sewers, the author has devised an arrangement of a portable meter with hose pipes. The portable meter is attached to a street hydrant, and a 2½-in. hose pipe is conducted from the meter to a side entrance or manhole. An attachment is fitted at the end of the 2½-in. hose pipe, with two valves and smaller hose pipes, each controlled separately, and arranged so as to work up or down the sewer. Four men are employed in the sewer, two at each end of the smaller hose pipe, one spraying the water on the walls, the other scrubbing with a brass and steel brush. Two men are required on the surface or near the entrances to manipulate or guard the hose pipes. The Water Board insist upon having a waterman in attendance while the meter is working, and a charge of 12 cts., per hour is made. The cost of such cleansing, including water and labor, works out at about 3 cts. per lin. ft. run for a 3-ft. 9-in. by 2-ft. 6-in. brick sewer. There has been a very marked improvement in the air of a sewer after this cleansing has been carried out, and there can be no doubt as to the desirability, from a sanitary point of view, of such cleansing from time to time, as occasion requires.

Method of Relining Brick-Lined Reservoir

Water-tight Structures of Earth Embankment Design Lined with Concrete—Constructional Practice at Bellevue, Pa.

By Thos. Fleming, Jr.

It was customary ten or fifteen years ago for water works engineers and superintendents to construct large reservoirs with earth embankments and line them with brick. This method of construction has even been pursued since the advent of the concrete age. The usual method was to build the embankment on the interior on a one and one-half to one slope or a two to one slope, to cover this with a layer of clay puddle and then place on this a layer of brick laid on end with mortar joints or grouted joints. In some instances, a layer of asphalt was used either applied directly to the top of the brick lining or placed between the brick lining and the clay puddle.

These linings in many instances answered the purpose for which they were intended and where an absolutely water tight structure was not essential, they proved very satisfactory. Of recent years, the necessity of purifying water for domestic use and in many cases of pumping it to the distributing reservoir has made a question of leakage in reservoir construction an important one in the economical operation of water works plants.

Fortunately the advent of the concrete age and the cheapness with which reinforced concrete work can be constructed have furnished a ready solution of the problem. New water tight reservoirs of earth embankment design are now invariably lined with concrete. Many of the leading engineering firms use reinforced concrete structures almost exclusively as if properly designed, these structures as a rule can be constructed as cheaply as the earth embankment type and can be made absolutely water-tight. The writer in his specifications calls for a minimum loss of one vertical inch per 24 hours in reservoirs 15 to 20 feet deep. He has constructed several reservoirs recently and in not a single instance have they failed to meet the contract requirement.

The problem of repairing the old reservoirs, built by the former method and now leaky, is not so simple. It always requires greater ingenuity to make good an old job than to construct an entirely new piece of work. Then too, the client does not feel like spending very much on repairs to an old structure that has proven faulty. The result is that the engineer who undertakes such work is very liable to fall short of the mark and incur the everlasting displeasure of his clients.

The reason for the failure of the old type of reservoir to be water tight can be ascribed as a rule to one of the following causes: Absence of expansion joints, lack of homogenity in the lining, porosity of the lining, unequal settlement of earth embankment.

Expansion joints were not used, as the theory was that the joints between the bricks would open an infinitesimal amount thereby taking care of contraction but not to such an extent as to permit leakage. This result was not obtained in practice. In the Bellevue reservoir, to be hereafter described, there was very little leakage in the summer months but several hundred thousand gallons per day in the winter and this in spite of the fact that the brick work consisted of a two foot vertical wall circular in plan and backed up with an earth embankment so that there was outside pressure against a masonry arch.

Probably the most serious item is lack of homogeneity of material. The slightest settlement in an earth slope embankment at any point is very apt to cause the brick work to settle at the same point and to open the joints between bricks. Where concrete slabs are used, the slab will arch over any small settlement and it will take considerable settlement to break the lining.

As concrete is the material that has proven so successful in new construction, it is naturally looked to for remedying the faulty construction in old work. It is especially adapted to lining work as it is comparatively cheap, can be made impervious when properly placed, can be placed in large units not subject to small settlements in foundation, and can be provided with exponsion joints.

Where the old lining has a good foundation and has not settled too unequally it will furnish an excellent backing for a concrete lining. This should be placed in blocks eight feet square and six inches thick. The blocks should be laid in checker board style with alternate blocks first and with balance of blocks after the first set have completely set up. There should be a three-inch lap joint left on the bottom of the first set of blocks and a ⅜-inch opening above this along between the adjacent blocks. After the second set of blocks have been poured, the ⅜-inch grooves should be filled with a suitable asphaltum compound. The tops of all blocks should be finished with cement mortar before they have set up and this really forms the impervious coating to the concrete.

However, all brick-lined reservoirs do not have flat paved slopes. The Bellevue reservoir of the Ohio Valley Water Company which supplies a large suburban territory west of Pittsburgh, consists of an earth embankment with a vertical lining of brick masonry laid up with mortar joints and is two feet thick. It is backed up as previously stated by an earth embankment.

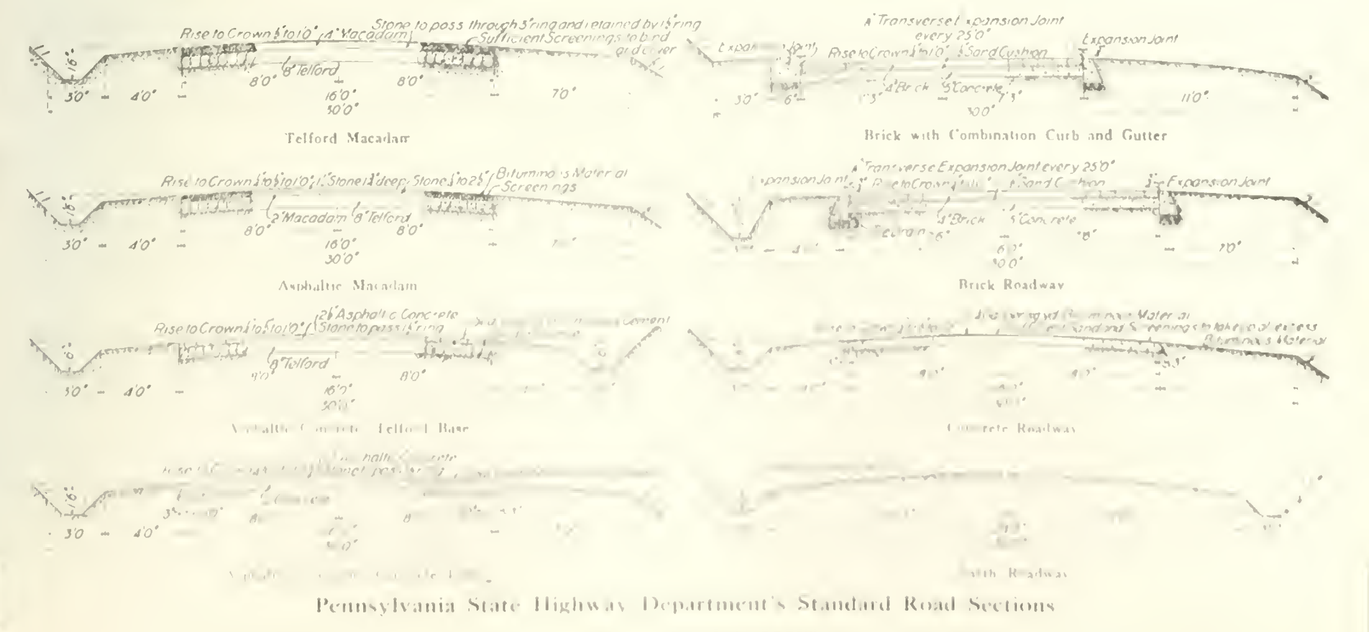
During the winter season the joints between the bricks opened up enough to allow as much as 400,000 gallons per day to leak out. An examination showed that this leakage must be through many infinitesimal cracks in the joints between bricks as there were no well defined points of leakage. The exterior embankment appeared to be in good shape and the leakage appeared to work down next to the wall to the shale formation below and thence through seams in the shale to a nearby ravine.

While the leakage was not seriously threatening the stability of the reservoir, yet it was a serious proposition financially. The cost of pumping water at this plant against the high head prevailing was at least three cents per thousand gallons. This cost includes only fuel and labor. It was estimated that the leakage averaged 100,000 gallons per day per annum, which amounted to a financial loss of $3 per day, or $1,005 per year. This capitalized at 8 per cent. would represent an investment of $13,688. Several schemes were proposed to stop this leakage, some of them involving patented water proofing methods, but it was finally decided to reline the reservoir with an 8-inch concrete lining. This lining was designed to be constructed in sections twenty-nine feet long horizontally and extending the full vertical height of the reservoir. The sections were connected by a metal expansion joint. This was made of thin sheets of copper of No. 28 gauge, 12 inches by 20 feet. The sheet of copper was corrugated and then folded at the centre for a width of four inches. One edge was inserted in the section to be built first and when the adjacent section was constructed the other edge was inserted in it, leaving the fold between the faces of the adjacent sections. The sections were built alternately. There were four forms for four sections, so that the work could progress continuously. It took a day to pour one section, and while this section was being poured the carpenters were bracing the section for the next day's work and laborers were removing forms from sections that had been poured two days before and were setting this form for work to follow two days later.

The form for each section was constructed in one piece with vertical struts and horizontal nailing pieces. These nailing pieces were 2 x 12, cut to the arc of the circle and spaced 2 ft. centre to centre. One-inch sheeting was nailed to these vertically, and 2 x 10 struts, also vertical, were spaced on the back to form 5 feet centre to centre. The braces were nailed to these struts. The specifications stated that the contractor must not cut any holes in the concrete floor for supporting or bracing form work. Heavy pieces of timber were therefore laid on the floor of the reservoir entirely across it and braced against the wall on the opposite side. The form braces were then nailed to these timbers and were arranged as shown in the photograph. Each section was poured in one day. The concrete was a 1:2:4 mixture and was placed wet and thoroughly spaded. The filling was made slowly so that the concrete in the lower part of the section would attain its initial set before the pressure from the above could cause a deformation of forms. Upon the completion of a section it was allowed to stand two days before removing the form. The surface was then gone over with tools, imperfections removed, and a thin coat of liquid cement grout was applied. Upon the completion of the work, the test showed that the reservoir was absolutely water tight. The work had to be completed in twenty-four days according to the terms of the contract, as while the reservoir was out of commission it was necessary to pump direct into the mains, which is a difficult feat under conditions existing at this station. The work was promptly executed by the contractor within the contract period. The total cost of the work was $2,000, so that the saving effected will pay for it in full in two years.

Standard Types of Road Construction

THE State Highway Department of Philadelphia have adopted several standard types of construction for their new system of highways. These include asphaltic macadam, asphaltic concrete on Telford and on concrete base, brick pavement and concrete roadway. It is expected that the asphaltic macadam and asphaltic concrete types of construction will be employed on the bulk of the street system. In the vicinity of towns, or on sections of the state road extending through towns, the brick pavements or concrete pavements may be selected. Standard plans and specifications have been prepared by the chief engineer covering all of the kinds of roads which the department proposes to build and the accompanying drawing shows the several typical cross sections of highway, as adopted by the department. A standard width of 16 ft. has been selected for all of the state highways.



Pennsylvania State Highway Department's Standard Road Sections

Architects in Session at the Capital

National Character of the Seventh Annual Assembly Held Last Week — Representative Attendance — Important Enactments

THE 7th annual meeting of the Royal Architectural Institute of Canada was held in Ottawa on Oct. 7-8. The official welcome of the city was given by His Worship the Mayor, Mr. Chas. Hopewell, who, in the course of an interesting address, dealt upon the high status of the profession and laid special emphasis upon the importance of town planning. Reply was made by the President of the Association, Mr. F. S. Baker, who paid a tribute to the beauties of the capital and the possibilities of its future development.

Mr. F. S. Baker, F. R. I. B. A., Toronto, retiring president, R. A. I. C.

One of the most important actions of the congress was the passage of a resolution reorganizing the institute as the representative body of the federated provincial associations. The institute now has a representative Canadian membership of between five and six hundred.

Opening Session

The opening session of the convention was held on the afternoon of Monday, Oct. 7, in the Carnegie Library, when the following resolution, proposed by Mr. H. B. Gordon, Toronto, and seconded by Mr. W. P. Over, of Winnipeg, was passed:

"The general assembly of the Royal Architectural Institute of Canada respectfully memorializes the Dominion Government as follows:—

"We desire to thank the government for its evident intention to obtain expert advice upon at least one portion of the park scheme for the city of Ottawa by advising the Commission to consult with a recognized landscape artist, and by its engaging another gentleman to report upon the best disposition of the new departmental buildings upon the property recently acquired by the government.

"We express our regret that a comprehensive study of the whole related matters of civic art, including location of public buildings, laying out of parks and connecting boulevards, and the difficult questions of traffic arteries and transportation, has not been attempted.

"We respectfully refer the government to our memorial of Nov. 24th, 1911, and the subsequent representation of our delegation and of our president, which set forth the great desirability of the creation of an advisory honorary commission composed of men of recognized artistic and

Members in attendance at the Seventh Annual Convention of the Royal Architectural Institute of Canada.

technical ability, to advise upon all matters of civic art connected with the Capital.

"We respecfully suggest that at least all vacancies on the present Ottawa Improvement Commission be filled by men as above suggested, having broad technical knowledge of civic art.'

One of the features of this session was the presentation of an interesting paper on "Skyscrapers" by Dr. Hodgetts, M.H.O. It is hoped to reproduce this paper in an early issue of the Contract Record. Dr. Hodgetts condemned skyscrapers from the health viewpoint, stating that they were injurious both to those who dwelt in the lower flats and to the inhabitants of neighboring buildings. There was considerable discussion on the paper, details of which we hope to provide later. The retiring president, Mr. F. S. Baker, in particular took a different view of the subject.

Mr. Alcide Chausse (Montreal), re-elected Honorary Secretary of the Royal Architectural Institute.

The election of officers resulted as follows: president, Mr. H. C. Russell, Winnipeg; vice-presidents, Messrs. Geo. Lang (Calgary), F. Wickson (Toronto), and G. A. Monette (Montreal); honorary secretary, Mr. Alcide Chausse (Montreal); honorary treasurer, Mr. J. W. H. Watts (Ottawa).

The Annual Banquet

The annual banquet of the Institute was held on the evening of Monday, October 7, at the Chateau Laurier. The new president, Mr. H. C. Russell, of Winnipeg, was toast master and the convention was attended by practically the whole of the architectural profession of the Federal Capital. Letters of regret at inability to attend were received from the Hon. Mr. Monk, His Worship Mayor Hopewell, Ald Greene, Professor Knox, Mr. Jno. Archibald, and the President of the American Association of Architects.

The toast to the city of Ottawa was made in a reminiscent manner by Mr. J. W. H. Watts, who has been a resident of the capital for some forty years. Response was made by Mr. A. G. Marshall, of the Builders' Exchange, and by Mr. Fennings Taylor.

The toast, "Sister Societies," was proposed by Mr. F. S. Baker, of Toronto, and replied to by Mr. Venne, of Montreal, who gave an outline of his idea of the division of labor in so far as the work of the Institute was affected, namely, that the provincial associations should concern themselves largely with the more material questions, such as legislation for the protection of the public from dangerous architecture, while it should be left to the Royal Institute to take up the more aesthetic and professional matters.

In his toast to Dr. Hodgetts, Mr. H. B. Gordon, of Toronto, expressed the hope that the Institute would encourage efforts to better civic conditions and promote town planning, and that architects would become imbued with the spirit of encouraging higher citizenship. He emphasized particularly the importance of architects' work and the responsibility of the profession in the development of the country. He expressed regret that municipal bodies were not more stringent in the matter of enforcing sanitary regulations.

The toast, "The Ladies," was proposed by Mr. R. Wright and responded to by Mr. McGiffin, of Toronto.

Mr. J. P. Hynes proposed "The Press," to which reply was made by Mr. Robt. C. McLean, who dealt upon the duty of the technical press and trade press in refuting the charge of selfish motives not infrequently brought against architects. The actions of the architect were frequently misconstrued and it was for the technical papers to set such misunderstanding right.

Tuesday, October 8

The second day of the meeting was devoted to a session of the council and to sight-seeing. The convention was brought to a close with a luncheon at the Royal Ottawa Golf Club and with the interprovincial golf matches.

It was decided to hold the next annual meeting at Calgary, a pressing invitation having been received from His Worship Mayor Mitchell of that city.

In connection with recent allegations of over-expenditure by the engineer's department, at Westmount, P.Q., Mr. Archibald Currie, the engineer, has been subjected to considerable criticism, particularly by one alderman. At the last meeting, further discussion took place as to estimates and expenditures, and Mr. Currie, who evidently had had enough of being badgered, warned the alderman who had been his chief critic that he took strong exception to the use of such words as "errors" and "miscalculations," and that he reserved the right to take any further action if necessary.

Mr. Ralph Modjeski, bridge engineer, of Chicago, well known in Canada by reason of his connection with the Quebec Bridge Board, has prepared plans for the construction of the proposed bridge on the Pacific Highway over the Columbia River, between Oregon and Vancouver. According to his plans, the structure will be made up of nine spans, each 320 feet in length, and a draw span with two openings, each 200 feet wide.

Highway Engineering Education*

By Arthur H. Blanchard, Professor of Highway Engineering,
Columbia University

THE educational training of the engineer who may enter that branch of civil engineering devoted to the economics, construction and maintenance of highways should be considered from two standpoints: first, the essentials, which, from an educational point of view, are considered as prerequisite to a successful career in highway engineering; and, second, practical methods of securing this training under American conditions.

The American youth who has expressed the desire to enter the profession of engineering has various channels open to him. The usual course followed is to enroll in one of the four-year engineering courses designated as civil engineering, mechanical engineering, electrical engineering, chemical engineering or mining engineering. There are, however, notable deviations. Several institutions and some engineers advocate a broader training for the engineering profession than is possible in the ordinary four-year course, and, in fact, believe that the profession of engineering demands the same type of training as is now universally recognized as desirable for men entering the legal or medical profession.

Usually the American boy, in entering on a technical career, has not fully made up his mind as to the particular field in which he is most interested. In the four-year courses he has in some cases one, and in others two years in which to make up his mind as to which of the five general branches of engineering referred to above he wishes to enter. It is self-evident that the ideal training is one which will prepare a student upon graduation to enter any one of the numerous fields of engineering. At least it is possible that a comparatively wide field of activities will be open to a man whichever one of the above courses he takes in the technical school.

Choice of Course

Having these general facts in mind, attention will now be riveted upon the situation which confronts the young man who may be one of our future highway engineers. Let us suppose, for example, that he has decided to devote four years to securing a technical education and that there is offered to him the four-year course in civil engineering and a four-year course designated as highway engineering. Which course should he take The evils of over-specialization in the undergraduate engineering course have been fully discussed in the Society for the Promotion of Engineering Education. Suffice it to say in this discussion before the general public interested in highway improvement that the graduate of the civil engineering course on the one hand has before him a large field of activities for all of which he is equally well equipped. For instance, he may enter the field of structural engineering, sanitary engineering, railroad engineering, geodetic engineering, hydraulic engineering, highway engineering, irrigation engineering and in many cases mechanical, electrical and mining engineering. On the other hand a graduate from a so-called four years course in highway engineering has, if the course is made up of the subjects which the title implies, only a limited field in which he considers that he is particularly proficient.

The concensus of opinion of eminent highway engineers and educators is to the effect that the highway engineer of the future requires the broad foundation which the four-year course in civil engineering gives. A knowledge of practically all of the subjects included is found of value in the manifold duties imposed in the various positions which he may occupy in the service of municipalities, states, counties, towns, estates, contractors' organizations, consulting engineers' offices and manufacturing companies.

Present Status of Highway Engineering

In the consideration of the training received and the subjects covered in the four-year course in civil engineering relating especially to highway engineering, it is of interest to note the present status of highway engineering in the civil engineering courses of American universities and technical institutions. An examination of the latest catalogues received from ninety-two institutions in the United States offering courses in civil engineering showed that seventy-eight included a text-book-lecture course in highway engineering in the curriculum. The number of recitation-lecture hours in the various courses may be arranged approximately in the following groups: thirteen, 15 hours or less; twenty-eight, 30 hours; seventeen, 45 hours; six, 60 hours; six, 75 hours; three, 90 hours; three, 120 hours; one, 135 hours; and one, 165 hours. Fifteen give some instruction in laboratory work while ten include special courses in highway surveying. In the case of institutions devoting over 90 hours to highway engineering, the general civil engineering course covers three years while a highway option is taken in the fourth year. A comparison of the present status of highway engineering education as outlined above with the conditions described by Logan Waller Page in his valuable paper on "Highway Engineering," presented before the Society for the Promotion of Engineering Education in 1909, is certainly encouraging, especially when it is remembered that only three years have elapsed. In 1909, according to Mr. Page, fifty per cent. of the institutions investigated did not include a course on highways in the civil engineering curriculum, while it is noted that of the courses in ninety-one institutions examined by the speaker, eighty-five per cent. now give a course in highway engineering.

The importance of the subject of the economics, construction and maintenance of roads and pavements in the United States at the present time demands that more prominence should be given to the course in highway engineering in civil engineering curricula. Having in mind the various component parts which go to make up the curricula, it appears that a well balanced civil engineering course under present conditions should contain a three hour course of one year in length devoted to highway engineering.

In such a course lectures and text book work should cover the following topics: historical review of the construction of roads and pavements; preliminary investigations incident to construction; principles of surveying and mapping peculiar to highway work; design of highways; drainage and foundations; construction and maintenance of earth, sand clay, gravel and broken stone roads, including a consideration of the materials which enter into their construction; general consideration of bituminous materials as such and their use in the construction of bituminous surfaces, and bituminous macadam, bituminous concrete, sheet asphalt and asphalt block pavements; the construction and maintenance of wood block, stone block, brick and cement concrete pavements; dust prevention, street cleaning and snow removal; construction of car tracks and pipe systems; comparison of roads and pavements; construction of sidewalks, bridges and culverts; and a general treatment of economics, highway administration and highway legislation.

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*Presented before the American Road Congress, Atlantic City, Oct. 3, 1912.

Laboratory Work

Laboratory work should be limited to what is sometimes called lecture demonstration work by the officers of instruction. In other words, although it is advisable that the methods of testing all kinds of bituminous and non-bituminous road materials should be brought to the attention of students in civil engineering by actual demonstrations in the laboratory or lecture room, it is not considered advisable to devote the time necessary for each student to run through complete tests as is done by students in the laboratories devoted to the testing of structural materials. In two to five afternoons all the fundamental tests employed in the examination of bituminous and non-bituminous road materials could be demonstrated before a group of from twenty-five to thirty men if the laboratory equipment was properly arranged and the work well planned out. Two to three afternoons would suffice if the testing of bituminous materials were covered in a course given by the department of chemistry. Unfortunately at the present time very few instructors in chemistry are familiar with bituminous materials, hence the methods of testing will have to be worked up by civil engineering instructors. Eventually some of the time now given by the department of chemistry to carbon compounds or quantitative analysis in courses for civil engineering students can be profitably devoted to the chemistry of bituminous materials.

A limited number of inspection trips covering the economics of highway location, and the construction and maintenance of various types of roads and pavements will be of value.

The time devoted to road or street surveys in some institutions, in addition to the regular work in railroad surveying and general surveying, is of questionable merit. Although there are many problems in highway surveying which are different from those encountered in other branches of surveying, it is doubtful if it is necessary or expedient to use up valuable time on this work considering the number of subjects which it is necessary to include in a broad course in civil engineering. The speaker's experience with civil engineering graduates who have worked under him on highway work has led to the belief that a graduate in civil engineering, who has had a good course in railroad surveying and in railroad curves, together with a comprehensive course in highway engineering as outlined above is admirably equipped to occupy minor positions in a field party on highway surveys. In these positions he may acquire, either through advanced study or special instruction the information and practice necessary to occupy the position of chief of party and the higher positions in the highway department connected with the bureau of surveys. It is, however, advisable in certain instances, where practicable, to divide the time devoted to railroad surveying so that a highway survey outside built up districts may be added to the course together with the preparation of plans, cross-sections and estimates.

In further consideration of the special training which will be of benefit to those entering the field of highway engineering, the educational plans which have been evolved to elevate the profession and to equip men thoroughly for this field of engineering work, foreign practice will be given consideration first.

Great Britain affords an illustration of one method by which well trained highway engineers may, under favorable circumstances, be secured. Fortunately for the British engineer his position in highway work is much more permanent than in the United States. There are several reasons why such is the case. Among others may be mentioned the recognition by the British public that the principle of continuity in office of capable engineers results generally in economical and efficacious construction and maintenance of public works. Those American engineers who visited Great Britain at the time of the Brussels International Road Congress in 1910 will, without doubt, find the majority of the prominent highway engineers of England occupying the same positions or higher positions when they attend the Third International Road Congress to be held in London in 1913. This is not a long period but could the same observation be made in regard to the personnel of many of our great state highway departments for a similar period? It should be stated, however, that the subordinate positions in the United States being, in many cases, under civil service regulation are more permanent than those effected by political exigencies. This condition of permanency of position of high officials in Great Britain means that it is possible for young men who are attracted to highway engineering to enter the department of some county or municipal engineer, and, proving capable, to acquire a valuable experience under the continued leadership of an able engineer. In this position a young man of the right calibre may, by hard work, including a large amount of home study, equip himself for the highest positions in highway work in Great Britain. Another safeguard of the British engineer, and an incentive to highway engineers in embryo, is the admirable practice which has been adopted in many cases requiring that applicants for a certain class of positions shall hold certain grades of membership in the Society of Municipal and County Engineers and in other cases certain grades of membership in the Institution of Civil Engineers of Great Britain.

France offers an entirely different type of training for men who are going to enter the field of highway engineering. All the important positions in this branch of the public service are occupied by picked men especially educated and trained for the service. After a preliminary general education covering as a final period that comparable with the four years high school training in this country, men of high standing are admitted to the Ecole Polytechnique, the course in which is practically two years in length. Upon graduation from this school, the men of high standing are allowed to select one of the several national schools, provided openings exist, in which they will secure special training for the public service in a given field. Those who enter the Ecole Nationale des Ponts et Chaussees devote three years to a general course in civil engineering under the leadership of engineers of the highest grade in the Department des Ponts et Chaussees de France. During the vacations these men are allotted to service on the construction of roads and bridges in various parts of France. It is evident that the training thus obtained is admirable and that the personnel of the engineering staff of the department of roads and bridges of France is exceptionally high.

In America, while in some cases an attempt has been made to give a special instruction in highway engineering [illegible] years' undergraduate course in this subject, this method has not given particular satisfaction for the reasons previously noted. Excellent work has been done by many universities in several parts of the country in giving extension courses to groups of men interested in various phases of highway improvement. Very little advanced work, however, has been done through the medium of the American university. The United States Office of Public Roads has evolved a scheme by which men may secure a certain amount of advanced instruction and training in that part of highway engineering dealing with highways outside of built-up districts. This plan is to place the student engineers in the charge of men in the service of the Office in various parts of the country on different kinds of highway work. When it is impossible to work in the field, the men do a certain amount of office work at Washington, receiving instruction by means of lectures on certain phases of highway engineering and also do laboratory work on the testing of both bituminous and non-bituminous road materials.

In 1911, through the generosity of Charles Henry Davis, President of the National Highways Association, there was founded at Columbia University a graduate course in highway engineering. The object in founding this course was to elevate this branch of the engineering profession and to provide an opportunity for men engaged in highway work to obtain advanced instruction and training in the various phases of highway engineering under the most favorable conditions. For many reasons it is fortunate that the first course of this character should be found at a university presided over by a president and trustees who look upon the work of the university from an exceptionally liberal standpoint. While maintaining the high character of all degrees conferred, nevertheless these men believe in opening the courses of instruction to any mature man provided he has the prerequisites for any given course and earnestly seeks information. Likewise it is fortunate that the administrative authorities allow the introduction of an innovation as far as the period of attendance is concerned inasmuch as the graduate course referred to is given in the period from December 1st to April 1st. An engineer, therefore, who desires to take all the graduate courses in highway engineering and allied subjects which fulfill the requirements for the Master's Degree will necessarily be in attendance for two winter periods, the equivalent of one collegiate year. The selection of this period in which to give the instruction was based upon the prevailing idea among leading highway engineers that it would be feasible for many men to obtain a four months' leave of absence during the dull period of the year. This prediction has been found to be correct.

As this plan is somewhat of an innovation in engineering education, it may be of interest to cite certain facts in connection with the attendance during the winter period of 1911-1912, which was the first period under this plan. Although the graduate courses were not brought to the attention of engineers until November 1911, there were in attendance fifteen men affiliated with highway work, thirteen of whom registered as candidates for the Master's Degree. It is of interest of note that this group included men connected with state highway departments, contractors' organizations, municipal departments, engineering-sales departments of manufacturing companies, county highway departments and consulting engineers' offices. The experience of these men ranged from one to twelve years. They came from widely distributed localities, Connecticut, Massachusetts, New York, Pennsylvania, Maryland, North Carolina, Alabama, Panama and British Columbia being represented.

The curriculum of the graduate work in highway engineering comprises advanced courses in the economics and design of roads and pavements, including a thorough discussion of bituminous surfaces and bituminous pavements; highway bridges and culverts; mechanical appliances used in highway engineering; road and street surveying and highway design; highway laws and systems of administration; management engineering; bituminous and non-bituminous road material laboratory courses; seminars in highway engineering literature; chemistry of bituminous materials; engineering geology; optical mineralogy; and inspection trips covering various types of roads and pavements and manufacturing plants producing highway materials.

A large staff of non-resident lecturers in highway engineering, which includes many of the most prominent highway engineers and chemists in the United States, is employed to give instruction on specified subjects forming an integral part of the various courses. It was decided to throw these special courses open to the engineering public and to hold the same during evening sessions in order that this feature of the work may be of maximum benefit to all that may find the University accessible. An attendance of from fifty to one hundred engineers at many of the lectures during the past winter period showed the interest taken in the many problems of highway engineering presented.

During the 1912-1913 winter period a special arrangement will be introduced which is considered of particular interest to practicing highway and chemical engineers. Many, who cannot secure a four months leave of absence, have expressed the desire to devote from six to seven weeks at Columbia University in securing information relative to the manufacture and testing of all kinds of bituminous materials and their use in the construction and maintenance of bituminous surfaces and bituminous pavements. Arrangements have, therefore, been made so that courses covering the above subjects may be taken either independently or as an integral part of the unified graduate course in highway engineering. During a continuous period of about six weeks, beginning in the latter part of December and ending during the first week of February, three courses will be offered as follows. Two weeks will be devoted to a demonstration lecture course on the mining, manufacture and testing of all kinds of bituminous materials; the next two weeks will be devoted to a course on bituminous surfaces and bituminous pavements; while during the final period of two weeks will be given a laboratory course in which those enrolled will test various types of bituminous materials, make analyses of unknown materials, and write specifications covering the use of bituminous materials under varying conditions. Each course will comprise forty lectures or eighty laboratory hours depending upon the character of the course.

During the coming year at Columbia it is expected that another innovation will be introduced inasmuch as, in connection with the graduate work in highway engineering, there will be founded several research fellowships by various manufacturing companies. The research workers holding these fellowships will investigate problems of particular interest and value to the manufacturing concerns founding the same. It is expected that many problems of wide interest to those engaged in highway work will be thoroughly investigated through this medium. While admirable work has been done along many lines in the research laboratories of our universities, the speaker earnestly hopes that more attention will be given in the next decade than in the past ten years to the multitude of problems in highway engineering which demand the best efforts of investigators for their ultimate solution.

Mr. Justice Guerin, sitting in Montreal, has dismissed an action brought to recover damages, under the Workmen's Compensation Act, for the loss of a workman who met his death while operating a concrete mixer. The action was by the widow, her husband, having been employed by the city. The Judge held that the accident was not provided for in the Act, and dismissed the action.

Building Progress at Calgary, Alta.

Activity Well Maintained—Good Records for Permits—Residence Work Heavy—Up-to-Date New Brick Plant at Glenbow

Special to the Contract Record and Engineering Review

Calgary, Alberta, October 5th, 1912

STEADY growth has marked the progress of building in Calgary for the past few weeks. Many new buildings are beginning to assume definite form as the work is being rushed so as to be closed in for the winter. Building permits to the value of $4,170,000 were issued during the month of September, making the totals for the nine months of the year $15,860,000. This sum includes the C. P. R. car shops, estimated at $2,287,000. In the main these figures represent a very steady growth. The bulk of the total is made up from the many small residences that are being built in all parts of the city.

The accompanying photographs serve to illustrate the progress and construction on a few of the buildings now under construction. These are typical of the class of commercial buildings now being erected in Calgary and are ample evidence of the confidence displayed in the future of the city, not only by outside parties but by local capitalists.

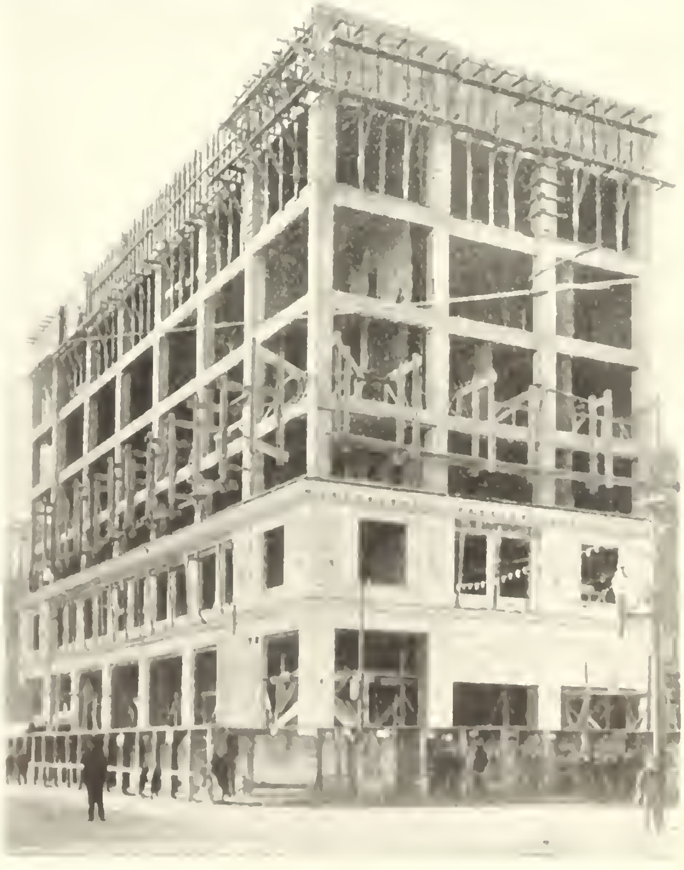
The Mackie Building, Calgary, now under construction. Architect, Mr. Jas. C. Teague Calgary

New Brick Plant

Construction is being pushed on the Glenbow plant of Brick & Supplies Limited, of Calgary, and it is expected that the first bricks will be turned out before cold weather sets in. This company owns a deposit of brick clay some 20 acres in extent, near Glenbow, 18 miles west of Calgary on the main line of the Canadian Pacific Railway. The deposit is a river silt and the common bricks to be manufactured will burn to a buff color. The clay will be harvested with a drag scraper operated by a 20 h.p. donkey engine. The stiff mud process of manufacture will be used, all the machinery being supplied by the American Clay Machinery Company. The machinery consists of a 24-inch disintegrator, a 14 foot pug-mill, a No. 1 Giant brick machine, No. 25 cutter with 24 foot off-bearing table, the whole having a capacity of 100,000 bricks per day. The power plant consists of two 80 h.p. high pressure boilers, with one 125 h.p. Allis-Chalmers Corliss engine. It is the intention at present to install eight tunnel steam dryers, having a capacity of 50,000 bricks per day, and at a future date to place eight more dryers to work up to the capacity of the machinery. One hundred and forty double-deck stiff-mud dryer cars will be used for transferring, loading to the railroad being done by gravity. The deposit lies in a hillside to the north of the railroad, and a private spur at the base will enable all the output to be handled by gravity. It is expected that the output of this plant for the first year will be about 15,000,000 common bricks, running for 300 days in the year. The company also contemplate the erection of lime-kilns, options having been secured on several deposits of limestone. Brick & Supplies Limited were incorporated in Calgary this year to carry on a general business in building supplies and for brick and lime manufacturing. Their capital is $125,000 and their officers are as follows: J. H. Evans, president; J. E. Shields, secretary; M. T. Chamberlain, treasurer.

Tall Chimney of the Radial Brick Type

In connection with the hotel now under construction in Calgary, the Canadian Pacific will enlarge the existing power plant by the addition of a heating plant and a laun-



The Burns Building   Architects, Messrs Hodgson Bates & Beattie, Calgary

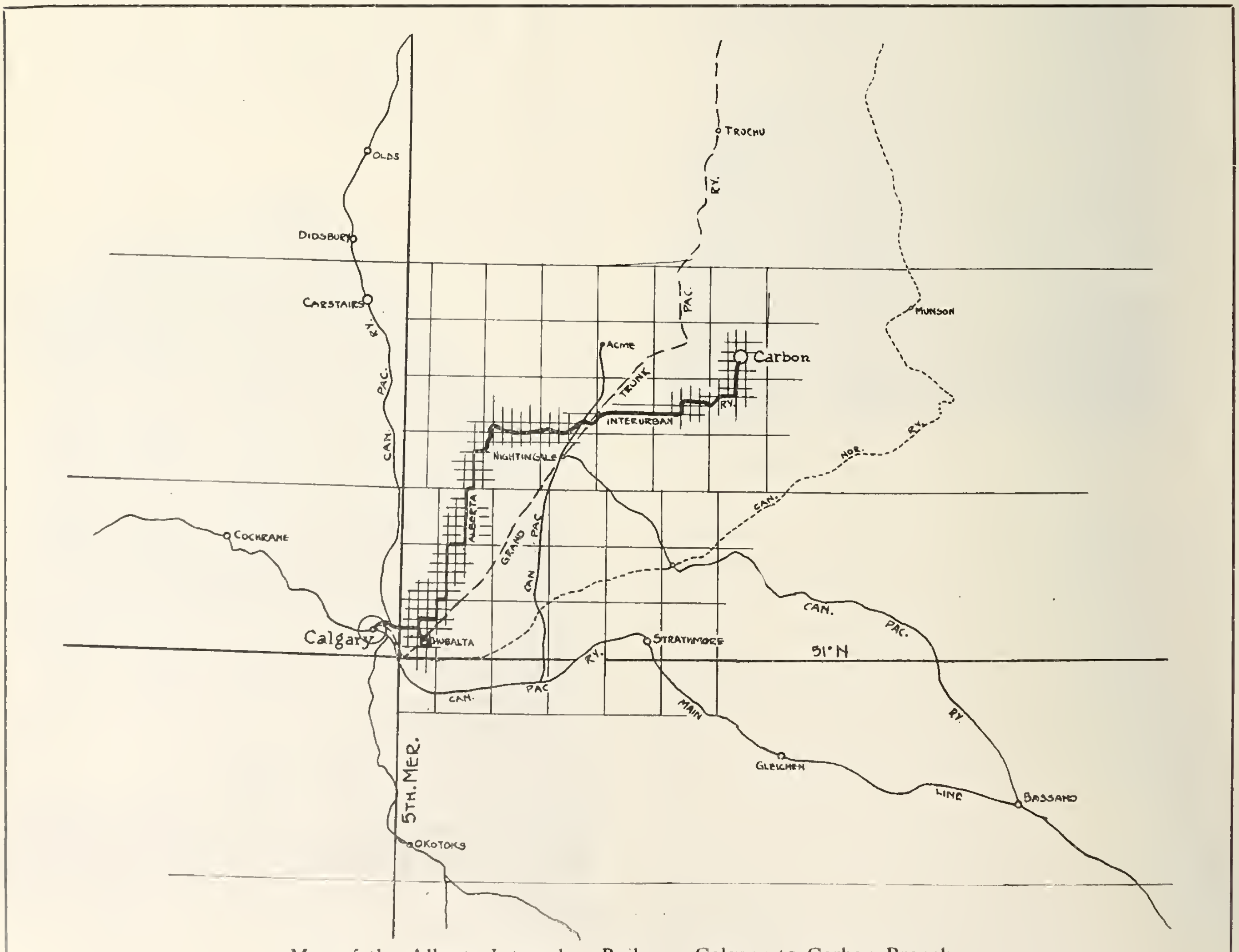
Canada Life Building. Architects, Messrs. Brown & Vallance, Montreal

dry The new building will be an extension of the present building, being 192 feet long by 51 feet wide. Connecting this to the hotel will be a tunnel, 7 feet by 7 feet 6 inches wide, 590 feet long, of waterproof reinforced concrete. This tunnel will be used for a passage-way for conveying laundry, and for a pipe-tunnel. A feature of this extension will be a tall chimney of the radial brick type, 210 feet from foundation top to cap, 17 feet 8 inches in diameter at the base, 9 feet 3 inches at the top, outside. There will be a baffle wall, 18 feet high, from the bottom of the two entering flues, and the inside will be lined with fire-brick for 30 feet above the base. Jones & Lyttle, Ltd., of Calgary, have already placed the foundation—some 150 cubic yards of concrete. The Canadian Kellogg Co., Ltd., of Montreal, have the contract for the chimney, which will be built on their system. Seven hundred tons of radial brick manufactured in Greendale, Ohio, will be used and it is expected that the chimney will be completed within thirty days. Mr. M. Neill is the local superintendent for the contractors.

The railroad situation in Calgary remains unchanged, although there are evidences of activity in and around the city on the part of both the C.N.R. and the G.T.P. Plans have been filed with the city and province for a new railroad to run north, but as yet no one seems to be able to find out either the parties behind it or its policy.

Alberta Interurban Railway

Construction is well under way for the first section of the Alberta Interurban Railway, running north-east to Carbon. There are now sixteen miles graded, and by Nov. 15th it is expected to have the first thirty miles out of Calgary graded and ready for ties and rails. An agreement is now being drawn up with the Grand Trunk Pacific Railway whereby the Interurban will use the tracks of the G.T.P. from Hubalta into Calgary. The Carbon-to-Calgary section will have a mileage of 66.8 miles, with a 2 per cent. ruling grade, and having a maximum curvature of 8 degrees. The first rails to be laid will be 60 lbs., but it is the intention



Map of the Alberta Interurban Railway, Calgary to Carbon Branch to replace these with 80-lb. rails later, using the lighter rails for sidings. There will be no structures on this first section except culverts. The equipment has not yet been chosen, but will be motor cars having internal combustion engines burning crude oil fuel. Permission has been granted by the Dominion Railway Commission for the floating of a $2,000,000 bond issue, but as yet little has been done in the matter of placing the issue. The company is prepared to continue construction for some time to come. It is expected that 300 miles will be under construction next year. Surveys have been completed and filed for the Calgary-to-Cochrane section, which will be continued to Banff. Mr. K. J. C. Zinck is manager, and Mr. W. C. Ferguson is Chief Engineer of the Alberta Interurban Railway. As will be seen from the map, the line of the railway follows closely the township lines, it being the arrangement with the land owners that 20 feet of the road allowance is to be used for the right-of-way. This Carbon Branch runs almost entirely within the C. P. R. Irrigation Lands and should enhance the value of these lands somewhat.

From the Federal Capital

Correspondence of the Contract Record

Ottawa, October 12, 1912

RECORDS seem to be in the making when one considers the general activity in the constructional field at present in Ottawa. The lumber mills are having considerable difficulty in keeping up to the demand, and the leading engineers, architects and contractors, as well as the supply firms, are all working over time.

The foundations have been excavated for the addition to St. Luke's Hospital, Elgin street, costing $100,000. Messrs. H. C. Hitch Company, of Montreal and Ottawa, are the contractors, and they are pushing the work as quickly as possible so as to have it finished within the stipulated period of eight months. Messrs. Horwood, Taylor & Horwood, of Ottawa, are the architects.

Tenders will be called shortly by Mr. W. E. Noffke, architect, for a six-storey store and office building on Nicholas street, to cost $60,000.

A site has been secured at the corner of Sunnyside and Fairbairn avenue, Ottawa South, on which a new Presbyterian church will be erected.

Ottawa's New Gas Works

Work will be commenced shortly on a new gas plant for the Ottawa Gas Company, costing about $300,000. The company have purchased some ten acres of ground north west of the incinerator, at the foot of Lees avenue, Ottawa East, in close proximity to the Grand Trunk and Canadian Pacific Railway. The constructional plans are almost completed. Mr. Dion is the general superintendent.

Construction has commenced on the Ottawa Electric Railway Company's new line on Queen street. As this street is already paved with asphalt, the expenditure for this short stretch of line will be exceptionally heavy on the company. The street will be paved with asphalt immediately the rails are laid, and in the track allowance scoria blocks will be laid.

Plans are being prepared in the City Engineer's Department for the new "Booster" plant building. The construction of this work will be commenced shortly.

The waterworks committee have washed their hands of the repairs to the new intake pipe, owing to council not adopting their recommendation. The council have accepted the plan proposed by Messrs. Storrie, Keefer and [illegible]. The committee recommended Messrs. Cauchon and Haycock's scheme. The whole matter has been placed in the hands of the Board of Control.

Messrs. Laurin and Leitch, of Montreal, have received the contract to supply and lay the pipe in the new aqueduct and also to attend to the repairs in the river section of the new intake pipe. The firm guaranteed to have the aqueduct section finished by December 1st. Acting Waterworks Engineer Storrie will supervise the work for the city. Work will be commenced at once.

Municipal Work

A plan for a proposed $38,000 new steel and concrete viaduct, to be constructed at Lees avenue, on the Hurdmans road, over the Grand Trunk and Canadian Pacific Railways, to the incinerator locality was before the Board of Control last week. The City Engineer prepared the plans, and it is claimed that the scheme would enable the men drawing garbage to the incinerator from the Ottawa, St. George and Rideau Wards to save three-quarters of a mile on the trip, or a mile and a half on the round trip. Application will probably be made to the Railway Commission to allocate the costs between interested parties.

Paving work throughout the city is being rushed to completion. The work will all be shut down on November 1 this year. Gangs of men employed by the city are already preparing the way for next year's pavements, and making the connections for the laying of the gullies.

Plans, profiles and estimates have been prepared by the City Engineer for several miles of pavements for 1913.

Ottawa Prices of Builders' Materials

(Dealers' prices to contractors delivered on the job)

Brick, soft, per thousand	$ 8.00
Brick, arch, per thousand	9.00
Brick, face, per thousand	10.00
Brick, veneer, per thousand	12.00
Brick, pressed, No. 1, per thousand	18.00
Brick, enamelled, per thousand	75.00
Blackboard slate, per sq. ft.	.32
Building paper, per roll	2.80
Cement, per bag	.50½
Crushed stone, per ton	1.40
Drain pipe, per length	.36
Fire brick, per thousand	30.00
Fire clay, per 200 lbs.	1.35
Fire-proofing, terra cotta block, per ft.	.07½
Hollow brick, per thousand	11.00
Insulating paper, per thousand sq. ft.	3.25
Keen's cement, per bbl.	5.50
Mortar color, per cwt.	1.25
Nails, per keg	2.15
Paper (building) per roll	.10
Paper (tar) per roll	.60 to .80
Paper (sheathing) per roll	.60
Roofing felt (2 ply) per roll	.80
Roofing tile, per sq. ft.	.12
Rubble stone, per ton	.80
Sand, per cu. yd.	1.05
Shingles (No. 1) per thousand	$3.50 to 4.25
Shingles (No. 2) per thousand	2.25
Sewer pipe, 4 in., per ft.	.11
Sewer pipe, 6 in., per ft.	.12
Weeping drain tile, 3 in., per ft.	.02½
Lead pipe, per lb.	5.25
Dry Colors—	
Red lead, per lb.	.06½
White lead, per 100 lb.	[illegible]
Gasoline in barrels, per gal.	.20
Boiled linseed oil, per gal.	1.10
Raw linseed oil, per gal.	.97

Well Known Contractor Passes Away

The late Peter Arnot, Toronto

The death of Mr. Peter Arnot, the well-known marine contractor, removes from the contracting community one of its best known and best esteemed members and from the civic life of Toronto a citizen who had been closely identified with its constructional development for half a century.

The late Mr. Arnot was born at Ashburnam near Peterborough in 1849. His business career commenced under the direction of his uncle, Mr. Emerson Coatsworth, late civic property commissioner. In 1875 he became a member of the firm of Charles Robertson & Company, a partnership which was subsequently dissolved. In 1885 he went into partnership with Mr. J. P. Medler, upon whose retirement in 1905 he carried on his operations single-handed. Of his more noteworthy contracts of recent date mention might be made of the construction of the sea-walls at the Exhibition Grounds and at Sunnyside, the reconstruction of the lake front at Hanlan's Point, the piers of the old Queen's wharf, and the carpentry at the central fire station, all at Toronto.

The late Peter Arnot

Mr. Arnot was a veteran of the campaign of '66; he was a member of the Presbyterian Church, of the Board of Trade, of St. Andrew's Lodge, A.F. and A.M., of the Knights Templar and of the Orange Order. He is survived by a widow, six sons and three daughters.

Designs for a somewhat novel apartment house have been prepared by Mr. Eugene Payette, Montreal, for the Gentlemen of St. Sulpice. The site, on Cote des Neiges road, is triangular in shape, the dimensions being 406 by 150 feet. The apartment house is to be constructed for large families, and the rooms have been laid out with this idea in mind. The exterior will be of sandstone and pressed brick, while one of the features is to be an inner courtyard in the centre, 110 by 65 ft., which is intended as a playground for the children. It will be paved, turfed, and planted with flowers, and it is proposed to erect a fountain in the middle. The building, which will be fireproof, will be four storeys high, and contain 24 apartments. Four of these will be too storeys in height, and will be, in reality, private residences, having separate entrances from the street. The other apartments will contain from eight to ten rooms each, which will include parlor, dining room, kitchen, three or four bedrooms, bathroom, cupboards, etc. Heat will be supplied from the Montreal College power house. Vacuum cleaners, wine rooms, refrigeration plants, incinerators where refuse will be destroyed by gas, are also to be provided. The contractor is Mr. Huberdeau, and it is hoped to have the building ready by September next.

Suggested Board of Engineering Control

Mr. Chas. A. Bowman, of Ottawa, has been awarded the first prize of $200 for the best essay on the formation of a national engineering service. The competition was inaugurated by Mr. C. A. Magrath, a member of the International Joint Commission and a former M. P. for Medicine Hat. The judges were Sir Chas. Fitzpatrick, Chief Justice; Mr. Collingwood Schreiber, C.M.G., Deputy Minister of Railways and Canals, and Col. J. V. Crowe, R.A., Commandant of the Royal Military College.

A good deal of interest attaches to Mr. Bowman's essay for the reason that it proposes a method of re-organization of the public service. He proposes that there should be formed a board of engineering control, composed of a number of engineers, with experience and ability sufficient to pronounce with authority upon any engineering project. Such a board should be non-political and of as high standing as the Supreme Court.

Mr. Bowman suggests that the board should comprise five directors who in the first instance, should be appointed by a Royal Commission after due investigation of all conditions relating to the engineering expansion of Canada. Once appointed, the board should fill all vacancies in its number. The board should be responsible to Parliament after the manner of the Auditor-General, and the House of Commons could require the resignation of any member of it. The board should have power to appoint or dismiss any subordinate and to approve or suspend any public engineering contract.

Mr. Bowman sketches a complete system of organization of technical experts under this board, the purpose being to insure the thorough treatment of every engineering project from all sides, and to prevent overlapping.

Thus, dredging could be done by a chief engineer of canals and water service, instead of by three several departments as at present; an experienced bridge engineer could be responsible for all important structural steel works; and a naval architect, under a chief engineer of marine service, could design vessels, canal tugs, dredges, survey ships, light-house supply ships, etc., irrespective of the department which might control them when built.

A deputation consisting of Messrs. John Quinlan and L. T. Marechal, K.C., of Montreal, representing the Builders' Exchanges of Canada, waited on the Minister of Finance and the Minister of Customs on October 9 and asked that the duty on all kinds of building stone, except rough quarry blocks, be placed on a properly protective basis. A large deputation urged the same thing on the government last March, and the representations were in support of the claim then made. The deputation complained of an inadequate duty and also of railway discrimination, their statement being that, whereas Canadian rates differed, the American rates were the same on both rough and dressed stone. These points were given a careful hearing by the two Ministers, who had with them the chief tariff officers of the two departments. No definite promise was made in reply to the representations, the Ministers, however, undertaking to give the matter careful consideration.

Cement Bids for Panama Canal

Bids were opened in Washington September 3rd for furnishing the cement required to complete the canal, estimated at 1,000,000 barrels, more or less. Only two tenders were received. The manufacturers of Alpha and Lehigh cement, combined, offered to supply their products at $1.51 per barrel, in barrels; and $1.91 per barrel, in bags, the price in bags to be subject to a rebate of 10 cents a bag, delivery to be made at Jersey City, or Santa Cruz, California.

The "Canal Record" states that in connection with the advertisement for proposals, a letter was received from the Atlas Portland Cement Company, the former contractors, offering to continue the work on the canal, at the price obtaining under their former contract. Under the contract referred to, cement was supplied to the Canal Commission at the rate of $1.60 per barrel, in bags, from which there was deducted a credit of 68 cents, representing the value of eight sacks to the barrel at 8½ cents each, making the net price per barrel 92 cents.

The Alpha and Lehigh manufacturers were the lowest bidders of the two above mentioned, and, on the basis of their bid of $1.91 per barrel, in bags, less eight sacks to the barrel, amounting in value to 80 cents, the net price to the Canal Commission would be $1.11 per barrel, or 19 cents more per barrel than the price named in the Atlas company contract.

The chairman and chief engineer has recommended, subject to the approval of the Secretary of War, that a new contract be entered into with the Atlas Portland Cement Company, to supply all cement required to complete the Canal

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Winnipeg Building Record

Building permits at Winnipeg for the first nine months of the year exceed the total for 1911 by almost $1,000,000, the total being $18,062,850. The following table shows the record for the month of September, and the first nine months of the year in comparison with the figures for the corresponding periods last year:

	Permits	Buildings	Value
September, 1912	369	475	$ 1,728,250
September, 1911	311	378	$ 2,588,600
Nine months, 1912.	3732	4561	$18,026,850
Nine months, 1911	3732	3752	$16,500,500

British Cement Plant Nearing Completion

At the recent annual meeting of the Associated Portland Cement Manufacturers in London it was announced that the erection of the large plant now being built in British Columbia was proceeding satisfactorily and that it was hoped to have it in operation early next year. In addition to the British Columbia plant, the company's extensions outside of Great Britain during the year included the purchase of a modern plant in Mexico.

The company's operations for the year ended June 30, were moderately satisfactory. Profits after deductions which include £106,381 for repairs and renewals, amounted to £361,957, making, with £13,375 brought forward, £105,332. For the preceding year the profits after deductions, including £120,027 for repairs and renewals, were £388,241 making, with the sum then brought in, £129,588.

The Place Viger Hotel of the C. P. R., Montreal, is to be enlarged by the addition of 140 rooms, a contract for the work having been let to the Canadian Stewart Company Limited. The railway company have just completed the new station and enlarged the tracks at this point. Three storeys are to be added to a portion of the hotel, and the requisite connection made with the present building. The plans also include the construction of a wide entrance through the west end of the hotel in order to reach the station. During the summer, guests are to be served on the lower outside platform, the present stone arches being filled in by grille work, thus shutting off the diners from the open street.

Canadian Railroad Development

It is believed that the Ontario & Northern Railway Company will shortly commence construction work on the proposed line. Funds will be secured on an underwriting plan.

Sir Donald Mann, vice-president of the C. N. R., stated that Kamloops, B.C., would be the divisional point for distributing the rails for the company's construction in western Canada.

The Canadian Pacific Railway Company has purchased fifty odd acres on the east side of the Columbia River at Brisco and will lay it out as the C. P. R. Kootenay Central Railway townsite of Brisco.

There is uncertainty as to the actual location of the new Union Station at Toronto, rumor now placing it at the corner of King and Simcoe streets. Meanwhile the time given by the Dominion Railway Board to the railways to come to an agreement is rapidly passing.

Surveys are well advanced for the double-tracking of the Canadian Pacific Railway between Calgary and the Coast, and it is understood that work will be started in half a dozen places next spring. Mr. F. F. Busteed, Kamloops, B.C., is Engineer in Charge. Mr. J. G. Sullivan, Winnipeg, is Chief Engineer.

The Department of Railways has accepted the plans of the Canadian North-Western Railway for its railway from Hanna to Medicine Hat. Work on this road between Bruderheim and Vermillion is now in progress and considerable grading will be done this year. It is understood that active work on the Medicine Hat end of the road will be started early in the spring.

The Canadian Northern Railway is planning to rush work on its Calgary and Macleod branch with a view to putting it in operation in the spring. The Northern Construction Company, Toronto, has the contract for the entire branch, 35 miles of which, between Macleod and Periden Creek have already been graded. The rest of the work will be pushed from Calgary south.

Major Leonard, chairman of the national transcontinental, are closing up the line between Winnipeg and Cochrane that the last section will be completed by November 1. This means that after the first of November the national transcontinental will be available for carrying wheat from the West. At Cochrane there is a connection with the Temiskaming & Northern Ontario Railway, so that wheat can be brought south to Toronto and Montreal.

The Minister of Railways has approved surveys of the railway for the following improvements: Canadian Northern Ontario Railway, revision of Sudbury Port Arthur line; Canadian Northern Railway, revision of Thunder Hill branch; Canadian Northern Railway, revision of Humbolt Calgary line; Canadian Northern Railway, Bienfait to Estevan; Canadian Pacific Railway, Bergen, Man., northeasterly; Manitoba and N. W. Railway (C. P. R.), grade revision between Minnedosa and Bredenbury.

The Canadian Pacific Railway has filed at the Land Titles Office, Moose Jaw, Sask., its plan, profile and book of reference for the proposed new line from Moose Jaw southwesterly. It runs from a point in section 9, township 12, range 29, west of the 2nd meridian to a point in section 11, township 8, range 30 west of the 2nd meridian. This is the extension of the Moose Jaw-Southwesterly line and will link up the line from Moose Jaw to the Weyburn-Lethbridge line at the divisional point there. The present terminus is Expanse

Work has been started by the Northern Construction Company on the line of the Canadian Northern Railway starting from Bruderheim and running eastward via Vermilion, thence southward through Wainwright and Medicine Hat to the international boundary. If the season remains fairly open until about the middle of November, twenty-five miles of grade will be constructed, but the company undertakes to construct at least fifteen miles of grade this fall. One of the largest outfits will be employed and the work pushed with all speed.

Within the next two weeks the Grand Trunk and Canadian Pacific railways must present a joint statement to the Dominion Board of Railway Commissioners showing the exact status of the negotiations between the two companies regarding Toronto's new Union Station. In the meantime the railways announce that they will have entered an appeal to the Governor-General in Council against the viaduct order, thereby re-opening the whole viaduct and Union Station issue. The Board intimated that it possessed a proper sense of its responsibility in enforcing its previous Union Station order, and would be able to read between the lines of the railways' answer.

The survey is completed for the double-tracking of the C. P. R. between Calgary and the coast, and work will be commenced at twelve points on the route within six months. The construction will be rushed as swiftly as possible and there is a prospect that the line will be completed almost as soon as the Panama Canal is open to traffic. The second line will be approximately parallel to the present main line of the C. P. R., but the grade through the Rockies will be one of the lowest on the continent, and will provide facilities for freight transportation westward, that will outrival any line connecting the Middle West with the Pacific seaboard. The double line will accommodate more than four times the present traffic to the coast. The cost of the undertaking is estimated at about $30,000,000, the expenditure in some districts exceeding $100,000 per mile. It will be one of the most expensive railroads of its length in the world.

An arrangement has been made between the Canadian Northern Railway and the city of Vancouver for governing the railway free terminals alongside the Great Northern in the eastern end of False Creek, which lies in the heart of Vancouver. East of the main bridge there lies three hundred acres, tide lands, which, according to agreements made with the Great Northern and Canadian Northern are to be drained and filled in. One hundred and forty acres were last year deeded to the Great Northern which has four years in which to erect a million dollar depot and install yards on the filled-in land. The filling work is now proceeding apace. The Canadian Northern agreement mentioned above provides that ten million dollars are to be spent by that company in entering and improving the section remaining. A great boulevard will be run down the centre of the entire property along which industrial sites will be reserved by the city for leasing to manufacturing companies desiring trackage.

That the labor shortage on the Grand Trunk Pacific main line is now terminated is the statement of Mr. W. F. Carey, of Sims, Carey & Company, one of the four contracting firms responsible for its construction between Fort George and Tete Jaune Cache, and the prospects of an early completion are much more rosy in consequence. "There are at least 7,000 men at work on this section," he reports, "an unusually good supply for railroad work at this time of the year, and perhaps that accounts for the fact that farmers are short of men on their threshing outfits. One reason for the men sticking to the camps is that those on the main line of the Grand Trunk Pacific are probably the best that have ever been known in railroad construction work. There is lots of timber and good log houses, while the wages and food are also better than they have ever been before. It speaks well for camp conditions that those who left them a month or two ago are now returning, and the prospects for work on the grade are very good for some time to come. So much has been said about the I. W. W.'s that I would like the public to know that these agitators are not troubling us at all."

Personal Mention

Mr. C. A. Millar, President of Prices, Limited, brick manufacturers, Toronto, has left for the North country on a hunting trip of a few weeks.

Mr. H. J. Nelliss, of the firm of J. C. Nelliss & Co., constructing engineers, London, Eng., is at present in the west. He is taking a three months' trip through Canada.

Mr. Atwood, chief engineer of the Canadian Car & Foundry Company, Montreal, is now recovering from a nervous breakdown. He has been away from duty for more than three months.

Mr. W. Burton Stewart, vice-president of The Norton-Griffiths Company Limited, has just returned from the Pacific coast where he has been looking into the extensive interests of his company.

Mr. Geo. W. Wright, city engineer of London, Ont., has resigned. His letter of resignation was forwarded to the city council from Muskoka where he has been recuperating from a recent illness. Mr. Wright charges the council with having over-ridden his authority and generally made the position untenable. An investigation is promised.

Mr. M. E. Storey has been appointed manager of the Toronto office of the Goulds Pump Company, of Canada, Limited, successors to the Goulds Pump Company. This concern handles a complete line of power, centrifugal and turbine pumping machinery, and also a complete line of hand pumps. The Toronto office is located in the Kent Building.

The new officers of the Ontario Association of Architects are: President, C. P. Meredith, Ottawa; 1st vice-president, Jules F. Wegeman, Toronto; 2nd vice-president, A. C. Bond, Toronto; treasurer, J. P. Hynes, Toronto; registrar, H. E. Moore, Toronto. The other members of the council are: Professor Wright, Toronto, and Fennings Taylor, Ottawa. This is the first time the presidency has gone to a member outside of Toronto.

Dr. McLaughlin, an expert from the Surgeon-General's Office in Washington, D.C., who recently reported on the question of the pollution of the Great Lakes by the American cities, in the course of his report said: "I know that there is a strong sentiment against dumping raw sewage into the rivers and lakes, but this sentiment, while no doubt it is earnest, is largely due to lack of information. It is sentimental rather than practicable. Of course it might be different in the case of small rivers, but in such large rivers as we are considering here such a restriction is not necessary. To compel cities along the great lakes to so treat their sewage that it would not contaminate the lakes into which it is dumped, would place upon these cities an unthem in most cases."

Constructional News and Notes

An attempt made to abolish the Montreal Board of Control only received four votes.

The town council of Haileybury, Ont., has decided to take steps to install a filtration plant to treat their water supply.

The September building permits for Prince Albert amounted to $314,000, an increase of $166,400 over the same period last year.

Hamilton, Ont., is experiencing a shortage in the supply of stone, and road building in the city is being held back on this account.

Calgary has just passed a new building by-law, an important section of which grants extensive powers to the superintendent of buildings.

A commendable move on the part of the University of Toronto is the inauguration of a course in highway engineering by Professor Laing.

Messrs. H. J. Elliott, E. C. Baker and G. L. Alexander are named as the incorporators of the Montreal Cut Stone Co., Ltd., Montreal, capitalized at $100,000.

The Manitoba Association of Architects held its annual meeting at Brandon on September 28th. The visiting members were the guests of the city council and the local architects.

It is reported that Halifax, N.S., is to have a twelve-storey hotel containing six hundred bedrooms with baths attached. United States capital is said to be interested in this hotel.

The estimated cost of building a dam for the proposed reservoir on Seymour Creek, Vancouver, is $632,000. A committee has been appointed to look into the matter with the City Engineer.

The ratepayers of Bowmanville, Ont., voted on by-laws for water works and sewage systems and both were carried by large majorities. The cost of the two systems is estimated at $150,000.

The Standard Steel Construction Company, Limited, Toronto, has been incorporated with a capital of $200,000. Messrs. A. and J. P. MacGregor and Mr. A. E. Wilson are provisional directors.

Building permits in Vancouver for the month of September reached a total of $1,561,845 and there is every reason to believe that the $2,000,000 mark will be passed during the next three months.

The incorporation is announced of Messrs. Siemens Company, of Canada, Ltd. The capital stock is $100,000 and the incorporators are Messrs. G. E. McCann, A. G. Ross and A. T. Struthers, all of Toronto.

According to figures furnished us by Mr. Thos. Turnbull, Building Inspector, the building returns at New Westminster for the nine months ending September 30, amounted to $1,414,113, as compared with $911,477 for the corresponding period of 1911.

The Board of Control of the city of Toronto, and the Board of Trade, have under consideration the question of the proposed Federal Square scheme. The Federal Government will be strongly urged to take prompt action to provide Federal buildings in the city, adequate to its needs.

The Hardstone Brick Company, of Edmonton, Alta., are installing machines to give the plant a daily capacity of 60,000 brick. The factory will be operated by electricity supplied by the municipality. The first output will be used by the company in completing their own building.

Federal Engineering & Supplies, Limited, 281 Yonge street, Toronto, are making arrangements to move about November 1st to the new Lowes Building, at 90 Sherbourne street. They find their present premises are not commodious enough, and they have taken two floors at the latter address. The firm are carrying a large stock of Scaandinavia and Lanco Balata belting; also incandescent lamps, chemical fire extinguishers and chemical specialties.

At Windsor, Ont., considerable difficulty has been experienced in obtaining laborers. It is felt that the trouble is attributable partly to the unreasonably stringent regulations governing immigration, and it is possible that some representation will be made to the government in this regard.

A petition to the Hon. Jules Allard, Minister of Lands and Forests, Province of Quebec, requests that a Running Water Commission be established to investigate and report on the advisability of establishing storage reservoirs on the St. Francis River for the purpose of equalizing the flow of the river.

Owing to increases in materials and labor the railway companies have decided to raise cartage rates, the new tariffs being effective on November 11, as follows: At Montreal, Toronto and Hamilton, 3 cents per 100 lbs.; at other points where cartage agencies are maintained, 2½ cents per 100 lbs.; smalls, 20 cents each.

The Toronto Housing Company have purchased a 200-acre farm two miles north of Danforth avenue and four miles east of Yonge street, for a little more than $100,000. It is to be developed into a model garden suburb, and the idea is, if practicable, to give each tenant a quarter of an acre to be used as a market garden.

Regina's building permits, according to returns submitted to this journal by Mr. O. T. Falls, Building Inspector, represented for the month of September, 1912, the sum of $531,210, as against $425,700 for the corresponding month of 1911. For the nine months' period of 1912 and 1911 the totals were respectively $5,154,689 and $4,268,370.

An attractive booklet descriptive of Hamilton, the manufacturing centre of Canada, has just come to hand from the Commissioner of Industries, Mr. H. M. Marsh. The publication is convincing in its facts and artistic in its appearance. It is accompanied by an excellent map. Copies of the booklet may be obtained upon application.

The Federal Government have awarded the contract for the steel superstructure of the addition to the grain elevator at Port Colborne, Ont., to the Dominion Bridge Company. The price is $201,000. The engineer for the addition, Mr. J. A. Jamieson, of Montreal, is now preparing specifications for the concrete and other work.

The Montreal Council has referred to the Railway Commissioners the scheme of the Canadian Northern Railway for an overhead line from the proposed city station to the harbor. The city has already agreed to the plans for the Mount Royal tunnel, but want the Railway Commissioners to decide on certain points as to the overhead part of the scheme.

Number four of "Farm Improvements," issued by the Canada Cement Company, Limited, Montreal, contains a number of very readable articles. It is a Good Roads number, and devotes much of its space to questions of improvements in highways and the cost of material, particularly of concrete, with some very timely hints on the making of good roads.

The International Joint Commission is considering the proposal to establish a dam on the Canadian side to control the level of the Rainy River. Whether this is agreed to or not the Commission will meet to give its approval to the dam to be constructed on the American side of the International boundary. The parties to the hearing include the Ontario Government, the Federal Public Works Department and the Minnesota and Ontario Power Company. It is likely that the Joint Commission will recommend the appointment of a sub-Commission to deal with the whole question of the pollution of boundary water. It will consist of one representative from each country. Prof. Starkey, of McGill University, will be nominated as the Canadian member.

It has been decided to construct a portion of the King Edward highway, P. Q., with concrete. The road is the Canadian portion of the International Highway, connecting Montreal with several large cities of the United States. The road was originally to be constructed wholly of macadam, but the Minister of Agriculture and Highways, P. Q., decided to try cement on a portion of the road.

A clause in a proposed by-law now under consideration by the Toronto city council reads as follows: "All drains used for sewage or waste water under any buildings shall be of cast iron and of the kind and weight specified by this by-law." The Retail Merchants Association, through their secretary, have written to the Board protesting this clause which, they claim, would discriminate unfairly against the manufacturers of vitrified pipes.

The returns of Mr. Alcide Chausse, City Architect and Superintendent of Buildings for Montreal, show that the permits issued last month represented an expenditure of $2,146,018. In September, 1911, the permits were valued at $1,157,876. From January 1 to September 30 of this year, 2,985 permits, representing an expenditure of $13,327,194, have been issued, as against 2,983 permits and a total of $11,419,210 for the corresponding period of 1911.

The next meeting of the York County Council, which takes place in November, will have to deal with the question of road improvement as inaugurated last year in the "Good Roads" movement, and the continuance of which depends largely upon the action of the November meeting. In all, between the county, the city and the government, about $100,000 has been expended, and orders have been issued by the commission through the engineer for the abandonment of any further work this Fall.

Following on a legal decision that the Montreal Tramways Company cannot carry freight without the consent of the city, the company refuse to transport freight. This materially interferes with construction, especially as the company has hitherto carried large quantities of cement and crushed stone. The city and also the private contractors are hit, as it is impossible to get sufficient teams to haul material. Many contractors complained of the decision, and the aldermen promised to confer with the Tramways Company.

There is a little labor trouble in Montreal. The Tile and Mantel Layers' Union are now out on strike, owing to the masters refusing a demand for more pay and less hours. The Plasterers' Union have also sent to the contractors a request that the wages be increased from 45 cents an hour to 55 cents, and have given the requisite three months' notice to terminate their agreement. This will therefore lapse at the end of the year. The contention of the men is that their work is of a special kind and is not adequately paid, a view which is combatted by the masters, who will hold a meeting to consider the situation.

An expenditure bordering on $15,000,000 is called for in the plans for the improvement of Toronto harbor which will be submitted by the Harbor Commissioners to the Government. As the general scheme provides for a revenue from the improvements sufficient to meet all interest and other charges on the outlay, it is expected that the plans will be accepted. The plans call for industrial development all along the waterfront on the lines followed in connection with Ashbridge's Bay and include the boulevard scheme right across the front of the city. Preparations are already under way for making a considerable piece of new land at the foot of Bathurst street, one contract having been let for 2,000 yards of filling. An immense quantity of sand that will be dredged out will be used for filling in various localities.

Progress at Goderich, Ont.

The present season has been an exceptionally busy one with the Doty Engine Works, Co., Ltd., of Goderich, Ont., whose sales department report an increase of 20 per cent. in hoisting engines, as compared with last year. The company have made a number of important improvements.

All their reversible hoisting engines are now furnished with steel links supported by double hangers one on each side of the link, which does away with all cramping and binding that occurs with the single hanger. This feature enables the operator to reverse the engine with very little effort. The links are placed on the outside of the bed which is a more accessible position, besides obtaining longer eccentric rods giving an easier and more uniform valve motion. The eccentrics of the company's hoists are cast solid with the crank discs and therefore cannot slip into a wrong position.

Reversing Link

Another special feature is a new "flat disc throttle valve." This valve is a union in itself, therefore any of the internal parts can be removed and examined, without unscrewing any of the steam pipes. The flat disc cannot leave its seat and does not have the tendency to kant over on the leading edge and scrape on the seat when opening or closing as is the case in ordinary rock valves and flat slide valves; therefore the tendency of the valve to become leaky due to use is eliminated in the company's new throttle.

New Throttle Valve

Full sets of jigs and gauges are also being added to the firm's manufacturing equipment, this enabling them to furnish duplicate parts of their engines.

The company are also equipping one of their buildings with up-to-date machinery for the manufacture of boilers and all structural steel work.

Business prospects, according to a recent report from the firm, were never better at this time of the year.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Bowmanville, Ont.
Sewers and sewage disposal to cost $39,000. Clerk, John Lyle. Con. engineers, Chipman & Power, Mail Bldg., Toronto. By-law passed authorizing the work.

Dunnville, Ont.
Water mains. Clerk, J. W. Holmes. Engineer, A. M. Jackson and Supt. Waterworks Comm. Tenders received by engineer until Oct. 21st, for the supply of approximately 9,640 ft. 4 in. to 6 in. water mains with necessary valves, hydrants, etc.

Montreal, Que.
Water service pipes. Board of Commissioners have asked council for a grant of $4,800. Secretary, L. N. Senecal.

Sewers. Board of Commissioners will construct sewers in 10 streets in 12 wards of city. Sec., L. N. Senecal. Chief engineer, Geo. Janin. Engineer in charge, Major S. Howard.

New Westminster, B.C.
Sewers. Engineer, Jno. W. B. Blackman. Tenders received by Sec. W. J. Duncan, until Oct. 24th. Laying of 7¾ miles reinforced concrete sewers, 20 in.-54 in.; supply of 10,600 ft. reinforced concrete pipe, 20 in.-54 in.; and 1,660 ft. steel pipe, 48 in.

Ottawa, Ont.
Drainage. Clerk, J. Henderson. Engineer, N. J. Ker has been asked to prepare plans for the west end drainage outlet pumphouse. Pumps will be required.

Port Stanley, Ont.
Roadways—one up the Fraser Heights and one along the beach. The electric lighting system will be extended along these roadways. Plans in progress.

Revelstoke, B.C.
Waterworks to cost $10,000. Work to start as soon as possible on additions and extensions to present system.

River Glade, N.B.
Sewerage system for The Jordon Sanitarium Commissioners. President, J. K. Flemming. Commissioner, Dr. David Townsend. Plans to be prepared by Sanitary Engineer L. Quevileen, Montreal, c/o Jordon Sanitarium.

St. Boniface, Man.
Pump—variable speed motor driven pump of 1½ million gals. capacity, 550 volt, 2 phase alternating. Specifications at office of engineer. Tenders received by clerk, J. B. Cote, until Nov. 8th.

St. John, N.B.
Repairing and laying sidewalks. Clerk, H. E. Wardroper. Commissioner Pub. Works, M. E. Agar. Road engineer, Geo. N. Hatfield, 122 Broad street. City has purchased small tarvia tank from Caritte Patterson Co. and hired engine from St. John Iron Works to do work. If satisfactory they contemplate buying complete modern outfit for doing street work.

Southampton, Ont.
Tile sewer to cost $4,000, Albert St. to Lake Huron, for G.T.R. Ry. Co. and Town of Southampton. Clerk, J. C. Eckford. 36-in. tile sewer for stream diverted by G. T. R. from their station yard. G. T. R. supply materials. Town does excavating and laying. Plans and specifications have been prepared by G. T. R. engineer.

Toronto, Ont.
Sewer. Tenders received by Mayor, G. R. Geary, until noon Oct. 22, for construction of storm overflow sewer, Main, Garrison Creek Division. Sec. No. 3. Specifications at office of commissioner of Works, R. C. Harris.

Vancouver, B.C.
Paving. (Westminster Road). Clerk, W. McQueen. The Westminster Road Improvements Association have petitioned city and the Government has pledged $70,000 to the undertaking if started this year.

Winnipeg, Man.
Water pipe. Board of Control. Secretary, M. Peterson. Engineer, H. N. Ruttan, 223 James avenue. Tenders received until Oct. 17 for quantity 20-in. O. D. steel drive pipe for new wells.

CONTRACTS AWARDED

Burnaby, B.C.
Water mains to cost $40,192. Approximately 25 miles of pipes on Johnston, Gunn, North and River roads and other streets. General contractor, T. R. Nickson & Co., Ltd., 1901 Georgia street, Vancouver.

Edmonds, B.C.
Waterworks (extension) to cost $40,192. Engineer, Mr. Thompson. General contractor, T. R. Nixon, Dominion Trust Bldg., Vancouver, B.C.

Point Grey, B.C.
Waterworks extension to cost $200,000. Architects, Cleveland & Cameron, Rodgers Bldg., Vancouver. Clerk, B. A. Cunliffe, Kerrisdale. General contractors, T. R. Nickson & Co., Dominion Trust Bldg., Vancouver.

St. John, N.B.
Conduits for The New Brunswick Telephone Co. Manager, N. [illegible] Nesbett, Chipman Hill. Purchasing agent, Horace Black. Work of laying conduits on several streets is under supervision of Oliver Thompson. Heating boiler contract was awarded to St. John Iron Wks., Charlotte street, who are installing same now.

St. Thomas, Ont.
Sewer to cost $8,[illegible]. Engineer, M. H. Baker. General contractors, S. S. Harper & Son. Jute packing, cement, etc., required.

Sandwich, Ont.
Concrete pavement to cost $20,000, along river front. Clerk, E. R. North. General contractors, Gouin & Desjardins.

Sault Ste. Marie, Ont.
Paving. Clerk, C. J. Pim. General contractor for brick and bitulithic, Cleveland Trinidad Paving Co. General contractor for Rocmac, Rocmac Paving Co.

Simcoe, Ont.
Artificial stone sidewalks. Clerk, W. C. McCall. General contractor, Geo. Sidway, at 10½ and 18c. per sq. ft. Work to be done this fall.

Vancouver, B.C.
Paving to cost $25,000. Clerk, Wm. McQueen. General contractor, The Canadian Mineral Rubber Co. For paving Gorge Road from Manchester road to Carroll street.

Wellesley, Ont.
Cement walks. Clerk, P. F. Schummer, St. Clements. General contractor, J. Lichty & Son. Work to start at once.

Winnipeg, Man.
Grading and sidewalks for Rural Municipality of Ft. Garry. Engineer, D. R. Baribault, 607 Builders' Exchange. General contractor, Westrumite & Co., c/o Engineer for grading, Pembina Highway. General contractor, D. E. Sprague & Co., c/o engineer for sidewalks.

Railroads, Bridges and Wharves

Annapolis Royal, N.S.
Station to cost $5,000 for The Dominion Atlantic Ry. (C.P.R.) Engineer, M. V. Fullington, Kentville, N.S. Brick construction. Plans in progress. Work to start this year.

Calgary, Alta.
Bridge—reinforced concrete construction, 12 arch spans, 2 concrete approaches with ornamental towers. Clerk, M. Miller. Con. engineer, F. W. Leonard, Spokane, Wash. Plans prepared.

Coquitlam, B.C.
Bridge. Tenders for construction are to be called in a few days for combined tramway and vehicular traffic bridge. Prov. Govt., Dept. Public Works. Engineer, J. F. Griffiths, Victoria, B.C.

Bridge [illegible] mile away over Pitt River for C. [illegible] R. Railway. Div. engineer, H. Rindal, Vancouver, B.C. Width of span increased to 115 ft. at water level. Bascule span will be located near west bank. Plans ready.

Glen Williams, Ont.
Concrete dam to be erected for Glen Woollen Mills Co. Engineers, Muldron & Rodd, Guelph. Plans and specifica-

tions at engineer's and owner's offices. Tenders called.

Kingston, Ont.

Railway. Kingston & Pembroke Railway Company is authorized to construct spur for the North American Smelting Co. Ltd., Kingston. Sec.-treas., A. McNaughton.

Marysville, N.B.

Station for Fredericton & Grand Lake Coal & Railway Co. Pres., Sir Thomas Tait, Fredericton. Plans in progress.

Moose Jaw, Sask.

Railway construction for C. P. R. Resident engineer, R. C. Smith. New line to run from Moose Jaw southwesterly to a point on the Weyburn-Lethbridge line. Plans prepared.

Newcastle, N.B.

Steel bridge for Prov. Govt. Dept. of Public Works. Commissioner Public Works, Hon. Jno. Morrissy. Plans to be prepared.

St. Stephen, N.B.

Pier, 400 ft. long for Dominion Fertilizer Co. Solicitor, M. Marks Mitchell. Tenders received by owners.

Township Ross, Ont.

Bridge. Chief engineer, A. F. Stewart, Toronto. The Board of Railway Commissioners have authorized C. N. O. R. to construct bridge across Foresters Creek, Twp. Ross, County Renfrew, Ont.

Yarmouth, N.S.

Railway and wharf planned for Dominion Atlantic Railway. General manager, P. Gifkins, Kentville. Engineer, M. A. Fullington, Kentville, N.S. Work of constructing spur and extension to wharf is held up on account of transfer of steamers and wharf, property to the Eastern Steamship Co. of Boston, Mass. Heavy timber will be required for spur line.

CONTRACTS AWARDED

Belle Ewart, Ont.

Wharf to cost $8,000 for Dominion Govt., Ottawa, Dept. of Public Works. Sec., R. C. Desrochers. General contractor, Henry Hickey, Peterboro.

Harriston, Ont.

Bridge for Township of Minto. Reeve, W. C. Dryden. Clerk, W. D. McLellan. Engineers, Bowman & Connor, 36 Toronto street, Toronto. Concrete work, Jno. Tilker, $7.00 per cu. yd. Steel work, Sarnia Bridge Co., 176 North St., Sarnia, $1,475.00.

Kenilworth, Ont.

Steel Girder Bridge. Clerk, Albert Hellyer. Engineers, Bowman & Connor, 36 Toronto street, Toronto. Abutments, Wagner Concrete Co., King St. W., Toronto. Superstructure, Sarnia Bridge Co., 176 North street, Sarnia.

Midway, B.C.

Railway construction to cost $2,500,000, for Kettle Valley Ry., Penticton, B. C. Engineer, A. McCulloch. Messrs. Grant Smith McDonnell Co., 744 Hastings W., Vancouver, have been awarded the contract for grading 58 miles of railway. Wm. Bouthron, of Grand Forks, B.C., has contract for the erection of stations, section houses and water tanks at Rock Creek, Westbridge, Beaver Dell and Carmi.

Mount Forest, Ont.

Retaining wall for bridge to cost $3,500. Chairman, Geo. A. Bailey. Engineer, Bowman & Connor, 36 Toronto St., Toronto. General contractor, J. Langdon, Kenilworth P.O.

Owen Sound, Ont.

Retaining walls to cost $18,900. Dom. Govt., Ottawa, Dept. of Public Works. Sec., R. C. Desrochers. General contractor, D. M. Butchart, 919 5th avenue E., Owen Sound. R. McDowell, 635 2nd avenue W., Owen Sound.

Quebec, Que.

Stations for Commissioners Transcontinental Railway. District engineer, A. E. Doucet. General contractors, P. & T. J. Davis.

Ripples, N.B.

Station for Fredericton & Grand Lake Coal & Railway Co. President, Sir Thomas Tait, Fredericton. General contractor, Charles Currie, Fredericton, N.B.

Sault Ste. Marie, Ont.

Railway station to cost $1,000,000, for Algonquin Central & Hudson Bay Ry. Co. Architects, Arnold Co., Chicago. General contractors, McPhail & Wright. 3-sty. and basement, 48 x 150.

Souris, P.E.I.

Breakwater (extension) to cost $143,917, for Dom. Govt., Ottawa, Dept. of Public Works. Sec., R. C. Desrochers. General contractors, Beazley Bros., Ltd., Halifax, N.S.

Upper Maugerville, N.B.

Station for Fredericton & Grand Lake Coal & Railway Co. President, Sir Thomas Tait, Fredericton. General contractor, Charles Currie, Fredericton, N. B.

Public Building, Churches, Schools, etc.

Barrie, Ont.

Masonic Hall. Plans are under consideration. Chairman Committee, Alfred Wilkes, Editor "Barrie Gazette."

Brantford, Ont.

Methodist Church to cost $7,000, Rowdon and Marlboro streets. Sec. of Trustees, Harry Isaacs, 333 Chatham street. Architect, Taylor & Taylor, Hope Chbrs. 40 x 65. Plans prepared.

Grimsby, Ont.

Public building for Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Plans, specifications, etc., at Dept. Pub. Works, Independent newspaper office, Grimsby, and Post Office, St. Catharines. Specifications and form of contract may be obtained at office of the MacLean Daily Reports Ltd., Toronto and Montreal. Tenders received by Sec. until 4 p.m. Oct. 30th.

London, Ont.

Sunday School (extension) to cost $17,000, for Centennial Church. Pastor, H. A. Graham. Supt., Wm. Jeffery. Meeting to be called shortly to arrange for preparing plans.

Newboro, Ont.

Church to cost $4,000, for St. Johns Presbyterian congregation. Architect, A. Stuart Allaster, Brockville. 1-sty., 60 x 30, stone foundation, brick and stone construction. Plans being prepared.

Otterville, Ont.

Anglican church for St. Johns congregation. Architects, McBride & Fairfield, Bank of Toronto Chambers, London. 40 x 80, Sunday School 40 x 60, foundation stone construction, artificial cut stone. Plans prepared.

Outremont, Que.

Women's Rescue Home to cost $50,000, for Salvation Army. Chancellor, Staff Capt. T. Walton, 341 University street, Montreal. Site has been purchased and plans will be prepared.

Toronto, Ont.

Rink and refrigerating plant planned for Toronto University Athletic Association. Sec., Dr. W. B. Hendry. Designer, Pros. C. H. C. Wright, S, P. S. Hockey rink with ice surface, 200 x 90, equipped with refrigerating plant. Seating accommodation 4,000. Work will not start until next year.

Verdun, Que.

School to cost $65,000, Lasalle road. Sec., Geo. Ward. Architects, MacVicar & Heriot, 104 Union avenue, Montreal. Commissioners will erect 8-room addition to school, then remodel and rebuild present structure.

Yorkton, Sask

Theatre and office to cost $7,000, for Kirkpatrick, Ewen, Dobereiner. Architects, Black & Logon. 1-sty., 40 x 100, cement foundation. Plans prepared.

CONTRACTS AWARDED

Collingwood, Ont.

Rifle ranges to cost $5,000, for Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Samuel Woolner, Robinson street, cement and frame construction.

Fish hatchery to cost $20,000, for Dom. Govt. Dept. of Marine & Fisheries. Architect, P. C. Palin. General contractor, Wm. Tryer. Heating and water supply, G. Coslake. Cement foundation, reinforced concrete construction.

Glencoe, Ont.

Remodelling school. Clerk, Geo. Wilson. General contractors, McPherson & Clarke, McRae street. New seating, blackboards, etc., will be required.

Kingston, Ont.

Addition to General Hospital to cost $30,000, Bagot street. Chairman Building Committee, J. H. Minnis. Architect, Wm. Newlands, Bagot street. General contractor, R. F. MacFarlane, 310 Johnson street. Ptg. and glazing, T. Mahon & Co., 133 Brock street. Plumbing and gas fitting and steam heating, Elliott Bros., 77 Princess street. Electric wiring and fixtures, Jas. Halliday Co.

Longueuil, Que.

Church for St. Mark's congregation. Architect, W. J. Carmichael, Bell Telephone Bldg., Montreal. Heating and plumbing, Westmount Plumbing & Heating Co., St. Catherine west, Westmount, Que. Stone foundation, stone construction.

Montreal, Que.

Recreation Hall to cost $8,000, 2140 Christophe Colombe, for Rev. Freres, St. Gabriel, 2140 Dufferin. Architect and builder, Jos. Faille, 1144 Wellington. 3-sty., 50 x 100, brick construction.

Theatre and stores to cost $140,000, Bleury street, for Quebec Amusement Co. Manager, H. W. Conover, "The Nickel," Bleury street. Architect, Asselin & Brosseau, 17 Place d' Armes Hill.

ieneral contractor, C. E. Deakin, 11 St. acrament street. 4-sty., 98 x 166.

Iorth Toronto, Ont.
High school. Sec., H. G. Hooper. Arhitect, Page & Warrington, Confedertion Life Bldg. Mason, T. Palmer, Eginton P.O. 2-sty., brick foundation. rick construction.

Quebec, Que.
Extension to Old Ladies Home to cost 55,000, Grand Allee. Architect, Staveley & Staveley, Peter street. General conractor, A. Falkney. Iron and steel, Eastern Canado Steel & Iron Works, 508 Coristine Bldg., Montreal. Other contracts not yet awarded. 4-sty., 60 x 40, stone foundation, cut stone, pressed brick and structural steel construction.

Red Deer, Alta.
Theatre to cost $12,000, 1st street N.E., for A. Forrester. Architect, C. A. Sharman, Calgary and Red Deer. General contractors, Houston & Sons. Excavation, Black & Robertson. Mason, F. H. Gudmundson. Plumbing and heating, Day Hardware Co. 1-sty. and concrete basement, 25 x 110, solid brick construction.

St. Andrews, N.B.
Opera house and garage, Water street, for D. Will McKay. Builder, Wright McLaren. 2-sty., frame construction. Excavation started.

St. John, N.B.
Armory for Dom. Govt. Dept. Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, M. Sullivan, Kingston, Ont. Electric work, Collyer & Brock, 302 Lagauchetiere street, Montreal, Que. 2-sty. and basement, 230 x 170.

St. John West, N.B.
Shelters. 5 shelters for longshoremen are being constructed in sheds at Sand Point. Mayor, A. W. Frink. Commissioner Pub. Works, Miles E. Agar. Work is being done by day labor.

Sherbrooke, Que.
School to cost $28,000, Bellevue, for Catholic School Commissioners. Architect, J. W. Gregorie. General contractors, Simoneau & Dion. Iron and steel, MacKinnon, Holmes Co. 3-sty., 132 x 55, concrete foundation, brick construction.

Winnipeg, Man.
Underground laboratory under Normal School on William avenue, for Dom. Govt. (International Geographical Society). Prov. architect, V. W. Horwood. General contractor, The National Construction Co., Donalda Block. Reinforced concrete construction, 25 ft. underground, instruments to be installed to record earth movements.

Exhibition buildings, Main street. Chairman, M. H. Christie, 226 Chamber of Commerce. Architect, J. D. Atchison, Loan & Trust Bldg. General contractor, J. McDiarmid Co., Canada Bldg. Roofing, Winnipeg Ceiling & Roofing Co.

Business Buildings and Industrial Plants

Brockville, Ont.
Garage to cost $4,000, King street E., for A. C. Hardy. Architect, A. Stuart Allaster. 2-sty., 22 x 28, stone, brick and cement construction, stone foundation. Tenders received by architect.

Bassano, Alta.
Storage tanks for The Continental Oil Co. Manager, G. R. Morden. 2 tanks, capacity 600 bbls. will be erected in early spring.

Brandon, Man.
Boot and shoe factory to cost $67,000 is contemplatel by an English syndicate. Local representative, Victor Donaldson. 4-sty., machinery and equipment required.

Chamcook, N.B.
Additions for Canadian Sardine Co., St. Andrews, N.B. President, Sir Wm. Van Horne, 513 Sherbrooke street W., Montreal. Directors, F. P. McColl, St. Andrews, G. F. Johnston, Montreal. Architect, Hugh C. Jones, 127 Stanley St., Montreal. Company will increase their capital from $1,000,000 to $1,600,000, the addition to be used in extending and doubling the capacity of their plant.

Chelsea Green, Ont.
Hardware factory. R. C. Eckert, 434 Queens avenue, London, and George Trudell have purchased property of old Wilcox Mfg. Co., and will remodel and instal new special machinery for manufacture of hardware specialties. General office equipment, electric lighting, heating equipment, belting, shafting, pulleys, fittings for machines.

Elmira, Ont.
Bank building is planned for Metropolitan Bank, head office King W., Toronto. 36 x 50. Site has been secured on Arthur street.

Hamilton, Ont.
Factory to cost $20,000, for Parsons & Parsons, 104 Main street W. Architects, Mills & Hutton, Bank of Hamilton Bldg. 1-sty., 72 x 11, concrete and brick construction. Foundation in.

Lachine, Que.
Department store, Notre Dame and 7th avenue, planned for a syndicate. Interested, M. Miller, clothier, and J. Rosenthal, furniture dealer.

Maisonneuve, Que.
Store, &c., to cost $5,000, St. Catherine, for L. DesRosier, 51 St. Catherine St., Viauville. Plans ready.

Montreal, Que.
Stores and office building, Windsor street, for Henry Pearce, 118 St. James street. Plans to be prepared shortly.

Factory for The Vinot Car Co. of Canada and subsidiary companies, The Fearless Tire Co. of Montreal and The Automobile Carriage Bldg. Co. Directors, C. Ernest Gault, 54 St. Francois Xavier street. Geo. Fairbanks, 61 St. Francois Xavier. J. B. Baillargeon, 329 Ontario E. J. A. Michaud, 1570 St. Lawrence. Company has no office yet. Will erect large factory.

Preston, Ont.
Furniture store planned, Argyle street, for Jacob Werlich who has purchased site 15 x 65, 2 sty. and basement.

Regina, Sask.
Warehouse for Scott Bathgate Co. Owners have applied for lots 11 to 14 block 78, on Broad and 5th avenue for site and plans will be prepared.

Warehouse to cost $25,000 planned for Tudhope Anderson Co. Application has been made for 4 lots in block 124 on Osler street and 5th avenue for site.

Warehouse to cost $6,000, St. John street and 7th avenue, for Regina Trading Co. Pres., J. F. Bole, M.L.A., to be built on lots 11 to 12, block 137. Plans in progress.

St. Thomas, Ont.
Factory to cost $10,000, for A. J. Stough. 2-sty., 60 x 150, brick, cement foundation, steam heating, electric lighting, motor, steel riveting machines and blacksmith equipment will be required. Company manufacturers steel grave vaults. Excavating started.

Stratford, Ont.
Addition to plant planned for Canada Iron Corporation. Output of plant to be increased from 150 to 225 car wheels per day. Addition 75 x 75, reinforced concrete.

Toronto, Ont.
Store to cost $10,000, for Merven Lancaster, 186 Dundas street. Architect, P. H. Finney, 79 Adelaide street E. 1-sty., stone foundation, brick construction. Plans in progress.

Store and dwellings to cost $6,000, Ossington and Dupont, for F. Squires, Lennox and Palmerston. Architect, W. C. Mason, 358 Montrose. 2-sty., stone foundation, brick construction. Plans drawn.

Vancouver, B.C.
Flour mill planned for United Flour Mills Co., Minneapolis, Minn. President, C. V. Haglen. Work under consideration.

Windsor, Ont.
Factory buildings for The Leggett & Platt Spring Bed Co., Carthage, Mo. Architects, Crane & Pennington, Boug Bldg. 2 buildings each 1 storey. One 50 x 130, one 50 x 100; brick foundation, mill construction. Plans being prepared.

Wolfville, N.S.
Storage warehouse for Nothard & Lowe, England. Agent for company in Nova Scotia, C. H. R. Starr, Wolfville. Probable gen. contractor Jno. Brown, Lawrencetown, Anna Co., N.S. Cement foundation, frame construction. Above company intent to build three apple warehouses in the Annapolis Valley next year.

CONTRACTS AWARDED

Amherst, N.S.
Bolster shop for Canadian Car & Foundry Co. Pres., Nathaniel Curry, 581 Sherbrooke W., Montreal. General contractor, Rhodes Curry Co. Machinery required. Work will not start until next spring.

Aurora, Ont.
Factory to cost $15,000, for The Collie Cockerill Co. Architect, Mr. Andrews. General contractor, G. T. Browning. 5 sty., 50 x 150, cement foundation, white brick construction.

Calgary, Alta.
Business block to cost $24,000, Centre for H. O. Lem. Architect, J. B. Henderson, Beveridge Block. General contractors, McDougall & Forester, Board of Trade Bldg. 3 sty., 42 x 73, cement foundation, brick construction.

Stores and offices to cost $24,000, 8th avenue west, for Gravely & O'Neil. Bk

(Continued on page 73)

Tenders and For Sale Department

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

City of New Westminster, B. C.

The Corporation invites tenders for the construction of about 7¾ miles of combined sewers for districts A, B, and Outfall in Section No. 2 of Sapperton System. Laying Reinforced Concrete Pipe, 20 to 4 inches diameter, or construction of Monolithic Reinforced Concrete Sewers, providing and laying Vitrified Pipes up to 18 inches diameter. Twin 48-inch syphon and outfall.

Further information, specifications and plans may be obtained from J. W. B. Blackman, M. Can. Soc. C.E., City Engineer, and plans, etc., may be seen at the offices of the Contract Record and Canadian Engineer, Toronto.

Tenders are to be delivered to the undersigned, accompanied by a marked cheque of 5 per cent. on the amount of the tender on or before October 24th, 1912.

The lowest or any tender not necessarily accepted.

Plans and specifications can be obtained by depositing $25 with City Treasurer.

(Signed) W. A. DUNCAN,
City Clerk.

41-42-48

Mail Contract

Sealed tenders, addressed to the Postmaster General, will be received at Ottawa until noon on **Friday, the 15th of November, 1912,** for the conveyance of His Majesty's Mails on a proposed Contract for four years, six round trips per week, on Rural Mail Route from King, Ontario, to commence at the pleasure of the Postmaster General.

Printed notices containing further information as to conditions of proposed Contract may be seen and blank forms of Tender may be obtained at the Post Offices of King, Davis Corners, Eversley, Temperanceville and at the office of the Post Office Inspector at Toronto.

G. C. ANDERSON, Superintendent.
Post Office Department,
Mail Service Branch,
Ottawa, Sept. 30th, 1912.

41-45-45

Tenders for Drainage Work

Stanley Township

Tenders for Drainage Work (according to By-law No. 11, of 1911) estimated at 30,500 cubic yards, will be received by the undersigned up to **November 29th, 1912.**

All tenders must be accompanied by a marked cheque for ten per cent. of the contract price demanded.

Copies of By-law sent on application.

The lowest or any tender not necessarily accepted.

ROBT. J. RICHARDSON,
Clerk of Stanley Township,
Varna, Ont.

42-44-55

Board of Water Commissioners

Town of Dunnville

Tenders will be received by the undersigned up to 9 p.m. on the **21st of October, 1912,** for 9,640 feet (approximately) of four and six-inch water mains, together with the necessary valves, hydrants and specials.

Specifications and instructions to bidders may be had from the undersigned.

The Board does not bind itself to accept any tender.

ALAN MAIR JACKSON,
Superintendent.

42-54

City of New Westminster, B. C.

The Corporation invites tenders for the supply of about 1,660 feet of 48-inch steel pipe, bends and specials, for outfall and syphon of Section No. 2 of Sapperton System.

Further information, specifications and plans may be obtained from J. W. B. Blackman, M. Can. Soc. C.E., City Engineer, and plans, etc., may be seen at the offices of the Contract Record and Canadian Engineer, Toronto.

Tenders are to be delivered to the undersigned, accompanied by a marked cheque of 5 per cent. on the amount of the tender, on or before October 24th, 1912.

The lowest or any tender not necessarily accepted.

Plans and specifications can be obtained by depositing $25 with City Treasurer.

(Signed) W. A. DUNCAN,
City Clerk.

41-42-50

City of New Westminster, B. C.

The Corporation invites tenders for the supply of about 10,400 feet of reinforced concrete pipe of the lock or continuous jointed type, in sizes from 20 to 54 inches, for districts A, B, and Outfall of Section No. 2 of Sapperton System.

Further information, specifications and plans may be obtained from J. W. B. Blackman, M. Can. Soc. C.E., City Engineer, and plans, etc., may be seen at the offices of the Contract Record, and the Canadian Engineer, Toronto.

Tenders are to be delivered to the undersigned, accompanied by a marked cheque of 5 per cent. of the amount of the tender on or before October 24th, 1912.

The lowest or any tender not necessarily accepted.

Plans and specifications can be obtained by depositing $25 with City Treasurer.

(Signed) W. A. DUNCAN,
City Clerk.

41-42-49

CITY OF TORONTO

Main Drainage Works

Sealed tenders for the construction of Section No. 13 of the High Level Interceptor, addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only up to noon of **Tuesday, October 22nd, 1912.** The work consists of the construction of about 3,060 lineal feet of four-foot diameter circular brick or concrete sewer with connections.

Plans, specifications, forms of tender and other information may be obtained at the office of the Commissioner of Works, City Hall, Toronto.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.
October 1st, 1912.

41-42-47

Sealed tenders addressed to the undersigned, and endorsed "Tender for Harbor Improvements at Whitby, Ont.," will be received at this office until 4.00 p.m. on **Tuesday, October 22, 1912,** for the construction of **a** Stone and Concrete Esplanade Wall at Whitby Harbor, in the Township of Whitby, County of Ontario, Ont.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the offices of J. G. Sing, Esq., District Engineer, Confederation Life Bldg., Toronto, Ont.; H. J. Lamb, Esq., District Engineer, Windsor, Ont., and on application to the Postmaster at Whitby, Ont.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the contract. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS.
Secretary.

Department of Public Works.
Ottawa, September 24, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the department.—28624.

42-52

Agents Wanted

Large United States manufacturer desires to appoint agencies in Canadian territories, where not already represented, for the best line of Concrete Waterproofing coatings made. Attractive proposition. Box 621. Contract Record, Toronto, Ont.

42-53 T.F.

Tenders for Plumbing, Heating, Ventilating and Electric Wiring

will be received up to 5 o'clock **Monday, October 21**, for the new high school, Weston. Plans and specifications can be seen at the Secretary-Treasurer's, Mr. R. J. Dennis, Weston, or at 140 Kingston Road, Toronto. The lowest or any tender not necessarily accepted.

MUNRO & MEAD,
Architects.

42-59

Tenders for Motor and Pump

Sealed tenders will be received by the City of St. Boniface, Man., up till **November 8th, 1912**, for the supply and erection of a variable speed motor and a motor driven pump capable of delivering either 1,000,000 or 1,500,000 imperial gallons per twenty-four hours.

The pump must be capable of delivering either of these quantities against a pressure of 65 lbs. (domestic pressure) and 100 lbs. (fire pressure).

The current supply in pump house is 550 volts, 3-phase, alternating.

Plans showing layout and available space may be obtained at the City Engineer's office.

Each tender must be accompanied by a marked cheque or cash equal to five per cent. of the amount of tender.

The lowest or any tender not necessarily accepted.

Tenders to be addressed to J. B. Cote, City Clerk and marked "Tenders for Motor Driven Pump."

(Signed) J. B. COTE,
City Clerk.

42-43-57

For Sale

Stone crusher for road making. Also 16 h.p. gas engine, portable. Enquire Box 626, Contract Record, Toronto, Ont. 42-T.F.-58

To Architects

Competitive plans for a proposed City Hall at Moose Jaw, Sask., are desired by the City Council. Conditions for this competition may be obtained from the City Clerk, the Secretary of each of the Provincial Associations of Architects, or Mr. F. S. Baker, Traders Bank Building, Toronto. 42-43-56

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg 41 t f

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Partners Wanted

The advertiser has just built and equipped the best plant in Canada for the manufacture of doors and boxes, and wants one or two good men with capital to join him, either a man to take the financial end and other work, or one with a good knowledge of the manufacturing end of the business. The trade in boxes will be local, but doors will be shipped to all parts of Canada as well as to England. There is not a large specialized door factory like this one in Canada to-day. The demand for doors is increasing rapidly, and car loads are daily being brought from the States which can be filled by a good Canadian plant. All correspondence will be treated confidentially. Address Box 614, Contract Record, Toronto, Ont. 41 42 46

Business Buildings and Industrial Plants

(Continued from page 70)

of British North America. Architect, Lawson & Fordyce, Norman Blk., 8th avenue. General contractor, Richards Bros. Co., 409 5th avenue west. 2-sty., 50 x 100, cement foundation, brick construction.

Calgary, Alta.

Addition to workshop to cost $4,000, 1st street west, for Pryce Jones (Canada) Ltd. Architects, Hodgson, Bates & Beattie, Grain Exchange General contractors, G. H. Archibald & Co., Box 1739. 2-sty., 34 x 40, cement foundation, brick construction.

Cold storage to cost $20,000, for Calgary Brewing & Malting Co., E. of Elbow. Architect and structural engineer, Bernhard Barthel, Chicago, c/o owner. 2-sty., 78 x 48, brick and structural steel construction, cement foundation. Work being done by day labor.

Warehouse to cost $15,000, 4th street west. Builder and general contractor, Robin Hood Flour Mills, Calgary. 5-sty., 70 x 50, cement foundation, frame construction.

Dauphin, Man.

Addition to hotel to cost $6,000, Main street. Owner and builder, D. Hamilton. 2 storeys.

Edmonton, Alta.

Factory to cost $30,000, for Edmonton Leather & Shoe Co., Ltd. Pres., A. C. Todd, Meaford, Ont. Sec., W. E. Jewett. Architect and general contractor, Congdon & Clive. Tannery 2-sty., 60 x 130, factory 30 x 80

Hamilton, Ont.

Factory for Otis Fensom Elevator Co., Victoria avenue. Architects, Stewart & Witton, 2 Hughson street S. General contractor, W. H. Cooper, 197 Emerald street N.

Warehouse, Park and Merrick streets, for W. H. McLaren's Ltd., 25 McNab street. Architects, Mills & Hutton, Bk. of Hamilton Bldg. General contractors, Christman & Co., South Bend Ind. 1-sty. and basement, 75 x 100.

Kingston, Ont.

Warehouse for W. B. Dalton & Sons, Ontario and Princess streets. Architects, Power & Son, Brock street 1-sty., brick construction Tenders too high; company doing work by day labor.

Montreal, Que.

Alterations to Royal Bank of Canada, 147 St James street, to cost $15,000 Architects, H. C. Stone, 81 St Francois-Xavier street General contractors, Purdy & Henderson Co Ltd., Transportation Bldg. Will raise present roof 5 ft. and make additional office room

2 stores to cost $9,600, St. Hubert St. Wilfrid Gagnon, 640 St Hubert, general contractor Architect, Z. Trudel, 258 St. Andre 3-sty., 50 x 50, stone foundation stone construction

Store and factory to cost $22,000, St Lawrence street for S Berlind, 162 Elm avenue. Builders, Demers & Sarrazin, 151 St Dominique 3-sty., 40 x 80, cement foundation brick mill construction

Wholesale meat market to cost $60,000, Craig E. for Swift Canadian Co Ltd 63 William street Architects are owners Builders, Macdonald Eng. Co., 551 Monadnock Bldg., Chicago, Ill. 4-sty., 66 x 118, brick, stone and reinforced concrete construction, cement foundation.

Alterations to office building to cost $6,000, for Standard Realty Co., 435 St. Catherine west. Architect, House of Browne, 207 St. James. General contractor, D. F. Sheeny, 16 St. Cecile. 3-sty., 26 x 90, stone foundation, brick and structural steel construction.

Warehouse, Ambroise, for Alaska Feather & Down Co., Ambroise street. General contractors, The Jas. Shearer Co., 225 St. Patrick street. 2-sty., 60 x 120, cement foundation brick construction.

Studio to cost $8,000, 79 Union avenue, for J. & C. D. Morgan. Architect, J. McLaughlin, 15 Beover Hall Hill. General contractors, Henry Morgan & Co., Phillips Square. 1-sty., glass and structural steel construction.

Stores (alterations and additions) to cost $4,200, for J. Carriere, 411a Cadieux street. General contractor, Eugene Dayle, 328 Cadieux street. 25 x 25, brick construction.

Warehouse and office building to cost $1,000,000, Alexander street, for Alexander Syndicate Ltd., 707 E. T. Bk. Bldg. General contractors, Ross & McFarlane, 1 Belmont street. Heating and plumbing, Hickey & Aubut, 93 Dominion St. Plastering, McNulty Bros., 182 Mountain street. Electric work, Phillip Labee Marble, Smith Marble and Construction Co., 145 Van Horne avenue. Elevator, Otis Fensom Elevator Co., 368 St. James. 10 storeys.

Alterations to stores to cost $5,225, 470 St. Catherine W., for Estate Fairman, Com. Union Bldg. Architect, Hutchison, Wood & Miller, Royal Ins. Bldg. General contractor, T. S. Hudson Co., Room 12, Board of Trade Bldg.

Thorold, Ont.

Paper mill to cost $1,000,000, for Ontario Paper Co., Ltd. (Mr. Curtis of New York, and Mr. McCormick of Chicago) General contractor, Lockawanna Bridge Co., Buffalo, N.Y. Trustee, Jas. Battle, Thorold. Machinery required

Toronto, Ont.

Garage to cost $1,000, Roncesvalles Architect and builder, C. J. Powley, 66 Parkway avenue. Stone foundation stone and brick construction.

Addition to warehouse to cost $18,000, Catherine street, for MacDonald Mfg Co., 145 Spadina avenue. Builders Brown and Cooper, 297 Carlton street 1-sty., mill and brick construction

3 attached stores and dwellings to cost $12,000, Dundas street Owner and builder, H. E. Jarman, 10 Dundas street 3-sty., brick, cement foundation P in drown

Fertilizing plant to cost $27,000, St Clair and Keele streets, for Swift Canadian Co., St Clair and Keele streets Architects and gen contractors, Well & Gray, Confederation Life Bldg. 2-sty., 97 x 112 cement foundation, reinforced concrete brick and structural steel construction

Windsor, Ont.

Office building for Dr. J. S. Labelle London and Ouellette streets Architects Crane & Pennington Boug Bldg

Masonry and carpentry, Frost Winchester Co., Windsor. 3-sty., brick construction

Winnipeg, Man.

Stores and offices to cost $115,000, Portage and Carlton streets, for Oldfield Kirby & Gardiner, Portage avenue. Architects, J. D. Atchison & Co., Trust & Loan Bldg. General contractors, Sutherland Construction Co., Builders ExExchange. Plumbing and heating, Green & Lister, Fort street. 3-sty. and basement, 130 x 88.

Warehouse to cost $10,000, Austin St. Owner and general contractor, J. Farquhar, 269 Balmoral street. 3-sty., cement foundation, brick construction.

Printing office for Farmers Advocate Publishing Co. of Winnipeg, Ltd. Architect, H. E. Matthews, 254 Portage avenue. General contractors, Lyall & Mitchell Co., Union Depot.

Residences

Maisonneuve, Que.

Flats to cost $15,000, 5th avenue, for Alfred Leclaire, 17 St. James street, Montreal. Plans in preparation.

Flats to cost $9,000, Bourbonniere avenue, for J. Tremblay, 332 Bourbonniere avenue. Plans in progress.

Flats to cost $5,000, Letourneaux Ave. W. Pitre, 211 Bourbonniere avenue, is having plans prepared.

Flats to cost $5,000, Pie 9th avenue, for L. Dussault, 333 Lasalle avenue, Montreal. Plans to be prepared.

Preston, Ont.

Manse to cost $4,500, for Lutheran Church Congregation. Further particulars from chairman committee, Geo. A. Clare. Plans being prepared.

St. Andrews, N.B.

Residence for W. T. Hood, Outremont, Que. Site has been secured and plans will be prepared.

Toronto, Ont.

Apartments to cost $50,000, Bloor and Spadina road. Architects, Redmond & Beggs, Kent Bldg. Superstructure to be erected by day labor. Tenders open for all other trades. 3-sty., brick, felt and gravel roofing, steam heating, gas and electric lighting, structural steel.

4 residences to cost $8,600, Logan ave., for W. W. Hiltz, 682 Broadview avenue. Brick foundation, brick construction. Plans drawn.

Residence to cost $7,000, for Sturgeon Stewart, 16 Thorold street. Architect, J. A. Harvey, 164 Bay street. Tenders received by owner. 2-sty., brick and cut stone construction, brick foundation, structural steel.

Residence and garage to cost $5,000, 83 Macdonald avenue, for Robert J. Cole, 83 Macdonald. 3-sty., 56 x 24, cement foundation, brick construction. Plans drawn.

Victoria, B.C.

Apartment house to cost $200,000, St. Charles and Fort streets, for Harry Hume, Dom. Trust Bldg., Vancouver. Architect, S. A. Jennings. 6-sty., 74 apartments. Plans prepared.

Westmount, Que.

2 residences to cost $8,000, Grosvenor avenue, for W. G. Annable, 629 Grosvenor avenue, Montreal. Plans in progress.

Residence to cost $60,000, Oxford Ave. for G. Decary, 110 Notre Dame w., Montreal. Plans in progress.

Residence to cost $10,000, Argyle Ave., for Robert Fraser, 502 Grosvenor Ave. Plans ready.

Residence to cost $17,000, Belmont avenue, for W. H. Creed, 686 Roslyn avenue. Plans in progress.

CONTRACTS AWARDED

Barrie, Ont.

Residence, Ross street, for W. J. Pigott. General contractor, The Ball Planing Mill Co. Ltd. 2-sty., 28 x 40, brick veneer construction.

Residence, Bayfield street. Owner and general contractor, W. O. Partridge. 2-sty., 28 x 36, brick veneer construction, concrete foundation. Work being done by day labor.

Residence for Miss M. Hunter. General contractor, The Ball Planing Mill Co. Ltd. 2-sty., 28 x 36. brick veneer construction, concrete foundation.

Calgary, Alta.

Residence to cost $4,000, Elbow Park, for D. C. McKenzie, 1718 11th avenue w. Builder, A. P. Yonge, 327 13th Ave. w. 2-sty., 20 x 40, frame, cement foundation.

Residence to cost $4,000. Sunalta. Owner and builder, E. J. McPhelan, 310 14th avenue. 2-sty., 26 x 34, cement foundation, frame construction.

Apartments to cost $16,000, College grounds, for W. Stemecke, Empress Hotel. Builder, F. Faux, Marlborough Mansions. 2-sty.. 80 x 40. Plans in progress.

Residence to cost $4,000, Moncton avenue, for Mountain Spray Brewer, Calgary. Builder and general contractor, T. Steadman, 1522 15th avenue W. 2-sty., 36 ft. 6 in. x 37 ft. 6 in., cement foundation, frame construction.

Residence to cost $4,000, Bankview. Architect and general contractor, J. J. Davidson, 1317 15th avenue W. 2-sty.. 20 x 40, cement foundation, frame construction.

3 residences to cost $10,000, College grounds. Architect and general contractor, McLeod, Darroch & McKenzie, 1321 16th avenue. 2-sty., 24 x 36, cement foundation, frame construction. Excavation started.

Residence (Burnsland) for Astley & Shackle, 8th avenue west. General contractors and builders, Rodgers Bros.. 807 9th street N.W. 1-sty., 22 x 34, cement foundation, frame construction. Owners intend building 20 houses same as above.

Residence to cost $4,000, 13th avenue E., for Ida E. Langstroth, Bassano. Builder, T. H. Andrews, 329 14th avenue E. 2½-sty., 19 ft. 6 in. x 47 ft., brick. cement foundation.

Residence to cost $7,000, Elboya, for G. S. Orde, Union Bank. Architect. Lawson & Fordye. General contractor, W. H. Cawston, 616 26th avenue W. 2-sty., 34 x 41, frame, cement foundation.

Residence to cost $4.000, Elbow Park. Architect and general, Brown & Chisholm, 216 15th avenue. 2-sty., 22 x 40, cement foundation, frame construction. Excavation started.

2 residences to cost $5,000, Sunalta. Architect and general contractor, G. McKay, 1810 8th street W. 2-sty., 20 x 38, cement foundation. frame construction. Excavation started.

Residence to cost $4,000, Elbow Park. Architect and general contractor, R. Bliss McGlashing, 3909 5th street W. 2-sty., 30 x 31, cement foundation, frame construction. Excavation started.

Residence to cost $5,000, Elbow Park, for J. Hutchinson. general contractor. Architect, Alliance Investment Co., 711 1st W. 2-sty., 35 x 32, cement foundation, frame construction. Excavation started.

3 residences to cost $6,000, Mission. Architect and builder, Geo. Irish, 1310 3rd W. 2-sty., 20 x 30, cement foundation, frame construction. Excavation started.

Residence to cost $4,000. South Calgary. Owner and builder, Alliance Investment Co., 711 1st street west. 2-sty., 24 x 33½, frame, cement foundation. Excavation started.

Apartments to cost $75,000, for Patrick & Adams. Architect, J. C. Teague, 312 Dominion Bank Bldg. Excavating, Foster Cartage Co., 523 14th avenue W. 3-sty., 53 x 118. brick, cement foundation.

Hamilton, Ont.

2 residences to cost $6,000, Spadina avenue. Owner and general contractor, D. C. Taylor, 43 Melrose avenue.

Residence to cost $9,000. Owner and general contractors, Naylor & Robshaw, 38 Fraser avenue. Brick construction.

Kempenfeldt Bay, Ont.

Residence to cost $10,000, for Campbell Reaves, c/o Jno. Inglis Co.. 14 Strachan avenue, Toronto. Architects, Symons & Rae, 15 Toronto street, Toronto. General contractor, Thomas Rogers, Barrie. Excavating, A. E. Stapleton. Iron work, J. Neelands. 2-sty., concrete, brick and frame construction, concrete foundation, brick piers.

Montreal. Que.

2 residences to cost $8,400, Dorion. Owner and builder, O. Perrault, 982 Dorion. 3-sty., 50 x 40, stone foundation, stone construction.

Flats to cost $7,600, D'Arazon street. Owner and builder, A. Duranceau, 10 Jacques Hertel. 3-sty., 50 x 38, cement foundation. brick construction.

Residence to cost $8,500, DeLanaudiere. Owner and builder, J. Roch, 20 Rivard. 3-sty., 50 x 58, brick. cement foundation.

Residence and flats to cost $14,000, Alma street. Owner and builder, Jean Gauthier, 288 Orleans. 3-sty., 92 x 40, brick construction, cement foundation.

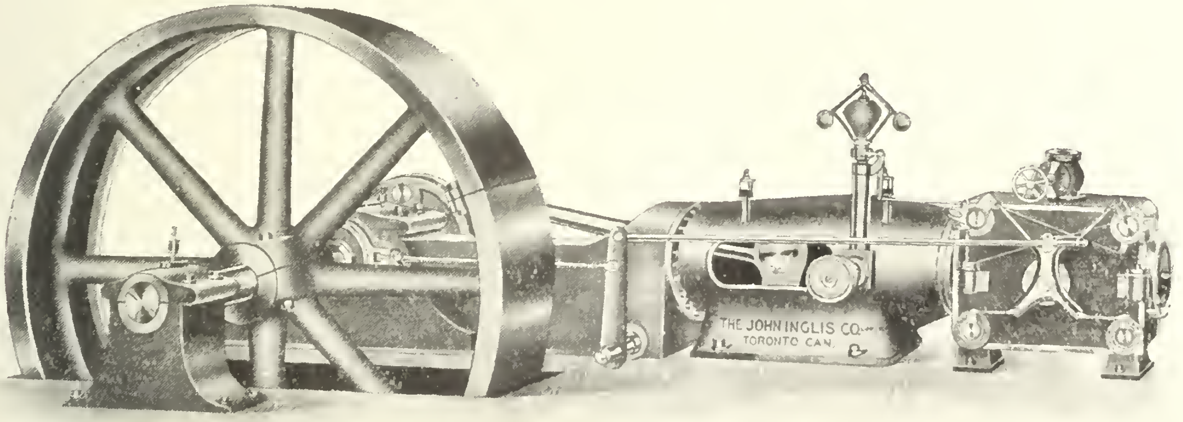
Residence to cost $4,200, Darling. Owner and builder, Theode Gauthier, 294 Orleans. 3-sty., 25 x 42, brick veneer, cement foundation.

4 residences to cost $12,000, Oxford street. Owner and builder, Gagne & Gagne, 2294 St. Laurent. 2-sty., 75 x 70, cement foundation, pressed brick construction.

Residence to cost $4,600. Owner and builder, J. A. Theriault, 1308 Chabot. 3-sty., 25 x 45, cement foundation, brick veneer construction. Excavating started.

Residence to cost $4,200, Darling. Owner and builder, Wilfrid Asselin, 240 Cuvillier. 3-sty., 30 x 45, brick veneer

EFFICIENCY
CORLISS ENGINES


THE JOHN INGLIS CO.
TORONTO CAN.

The Inglis idea of building Corliss Engines means not only guaranteeing results but seeing to it personally that the right results are obtained.

The same quality that has made Inglis Pumps and Boilers pre-eminent is found in Inglis Corliss Engines.

These engines include all the good features common to all engines *plus* many *exclusive* and *better* features found only in the *Inglis* Corliss.

The Inglis Engine is the one you want in your power plant. It is an ideal modern power producer.

We ask you only to investigate. Then the decision rests with you without undue solicitation.

The John Inglis Co., Limited

ENGINEERS AND
BOILERMAKERS

Strachan Avenue, TORONTO

construction, cement foundation. Foundations in.

Toronto, Ont.

One pair residences, cost $4,000, 309-11 Davenport road, for Urquhart & Sharp, 1125½ Bloor street west. Architect and builder, Frank Sharp, 1425½ Bloor street west. Brick, stone foundation

Alterations and addition to dwelling, cost $1,000, 136 Indian road, for National Trust Co., King street. Builder, P. Williams, 31 Pleasant Blvd. Brick construction and foundation.

Residence, cost $4,000, High Park ave. Owner and builder, A. J. Mercer, 335 Rusholme road. 2½ storeys, stone foundation, brick construction.

Tracadie, N.B.

Residence, cost $7,000, for Medical Superintendent of Lazarette. Dominion Government, Ottawa, Dept. of Public Works. Secretary, R. C. Desrochers. General contractors, Geo. Eddy Co., Bathurst, N.B.

Vancouver, B.C.

Twelve residences for The Coquitlam Terminal Co., 553 Granville street. General contractors, The Coquitlam Construction Co. Thirty more residences will be erected by owner when above are completed.

Westmount, Que.

Residence, cost $20,000, Belvidere Rd., for Senator Owens, 406 Dorchester St., Montreal. Architects, Saxe & Archibald, 59 Beaver Hall Hill, Montreal. Excavating, masonry and brick work, Fressing & Jorgensen, University street, Montreal. Three storeys, cement fndn., brick construction.

Winnipeg, Man.

Apartments, cost $120,000, Dorchester ave., for Belgo Canadian Real Estate Co. Manager, W. J. Christie. Architects, Chas. Bridgman, Canada Life Bldg. General contractors, Claydon Bros., Furby Place. Three storeys and basement, 100 x 120, brick, stone construction, concrete floors, brick walls between suites.

Residence, cost $5,000, Glenwood Cres. Owners and general contractors, Loveday & Darling, 270 Glenwood Cres. Two storeys, 24 x 36, stone foundation, frame construction.

Four residences, Rosser ave. Owners and general contractors, Smith Construction Co., 217 Kennedy Bldg. Two stys., 20 x 26 each, frame, stone foundation.

Residence, cost $5,000, McMillan ave. Owner and general contractor, J. Matthews, 482 Rosedale ave. Two storeys, 26 x 32, stone foundation, frame construction.

Residence, cost $9,000, Yale ave. Owner and general contractor, N. T. Wallace, 254 Kingsway. 2½ storeys, red brick, stone foundation.

PowerPlants, Electricity and Telephones

Brooke, Ont.

Extension to telephone system planned for the Brooke Municipal Telephone Co. Manager, Mr. Darvil. New equipment will be required.

Calgary, Alta.

Arc lamps, etc., cost $5,275. Engineer, J. T. Child. General contractors, the Canadian Westinghouse Co., Hamilton, Ont., for supplying one 75-light capacity constant current regulator, including one control panel, 75 arc lamps and 75 cut outs.

Edmonton, Alta.

Gas holder and tank, cost $139,356. Gas engineer, Jas. Brodie. General contractors, John Coates & Co., Ltd., Suffolk House, Common street, London, Eng.

London, Ont.

The Water Commissioners have decided to place new electric lights on every pole on Dundas street between Wellington street and the Fair Grounds. Work will start as soon as equipment is purchased. Engineer, H. J. Glaubitz.

Parkville, Ont.

Pole line. The Municipalities of Parkville and Lucan will take up the matter of building pole line from St. Mary's through Granton and Lucan to Parkville with Hydro-electric Commission. Clerk, J. H. Laughton.

St. John, N.B.

Power plant for Canadian Pacific Railway. General contractors, John S. Metcalf Co., 54 St. Francois Xavier street, Montreal. Excavating, the Courtney Construction Co., Mast street, St. John. Forms are being made ready for use in concrete foundation.

St. Thomas, Ont.

Gas main. Engineer, E. H. Caughell, Manager of Department. General contractors, Gartshore Thompson Pipe & Foundry Co., Stuart street west, at $32.10 per ton.

Canadian Iron Corporation plan to install three transformers for transforming 13,200 volts, 3-phase, 25 cycle to 550 volts, also a number of small motors. Specifications at owner's office who will also receive tenders.

Winchester, Ont.

Hydro-electric system is planned for the town. By-law passed authorizing same. Clerk, H. McMaster.

Windsor, Ont.

Electric lighting equipment, Sandwich street. Engineer, M. E. Brian. Alderman McTavish will call for tenders shortly for lights and wiring for Sandwich street.

Winnipeg, Man.

Electric travelling crane, cost $3,725. M. Peterson, secretary, Board of Control. Engineer, H. N. Ruttan, 223 James avenue. General contractors, Whiting Foundry & Equipment Co., Harvard, Ill.

New Companies

Expanse Lumber Company, Limited, has been incorporated with a capital of $100,000, to carry on a general business as dealers in all kinds of lumber, timber, shingles and wood products, with head office at North Bay. The provisional directors are R. M. Rattray, J. R. Moffat, bankers, and J. M. McNamara, barrister, all of North Bay.

Sturgeons Limited has been incorporated with a capital of $50,000, to carry on business as general contractors, with head office at Toronto. The provisional directors are J. S. Lovell, accountant, J. J. Dashwood and Robert Gowans, solicitors' clerks, all of Toronto.

Parsons-Booth Ltd. have been incorporated with a capital of $50,000, to carry on business as a land and building company, with head office at Toronto. The provisional directors are Arthur Parsons, J. E. Booth and F. G. Parsons, real estate agents, all of Toronto.

Standard Steel Construction Company Limited, has been incorporated, with a capital of $200,000, to manufacture and deal in steel and iron products and other construction materials, with head office at Toronto. The provisional directors are A. MacGregor, J. P. MacGregor, barristers, and A. E. Wilson, manager, all of Toronto.

City Construction Company, Limited, has been incorporated with a capital of $40,000, to carry on a general contracting business with head office at Toronto. The provisional directors are A. G. Robertson, financial agent, Wm. Leslie and Alex. Smith, printers, of Toronto.

Port McNicholl Investments Limited, have been incorporated with a capital of $25,000, to carry on business as a general land and building company, with head office at Toronto. The provisional directors are J. M. Vance, G. N. Shields, real estate agents, and D. W. O'Sullivan, barrister, all of Toronto.

C. E. Deakin, Limited, has been incorporated, with a capital stock of $500,000, to carry on business as general contractors and builders, with head office at Montreal. The incorporators are L. A. David, L. J. M. Dugas, barristers, and E. C. Baker, accountant, of Montreal.

Montreal Cut Stone Company, Limited, has been incorporated, with a capital stock of $100,000, to carry on business as quarry masters, stone merchants, road builders, etc., with head office at Montreal. The incorporators are H. J. Elliott, advocate, E. C. Baker, accountant, and G. L. Alexander, advocate, all of Montreal.

Siemens Company of Canada Limited, have been incorporated with a capital stock of $100,000, to carry on business as electricians, contractors, mechanical engineers, etc., with head office at Montreal. The incorporators are G. E. McCann, A. G. Ross, solicitors, and A. T. Struthers, accountant, all of Toronto.

Black Lake Asbestos and Chrome Co., Ltd., has been incorporated with a capital stock of $4,000,000, with head office at Toronto. The incorporators are G. M. Kelley, J. D. Falconbridge, solicitors, and D. W. Cooper, law student, all of Toronto.

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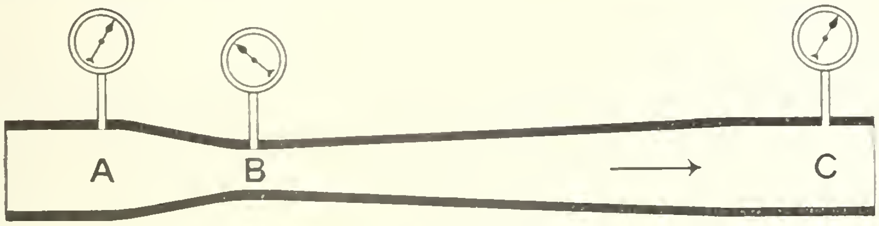

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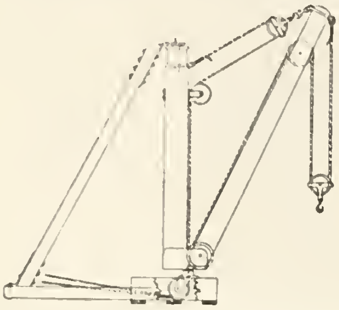

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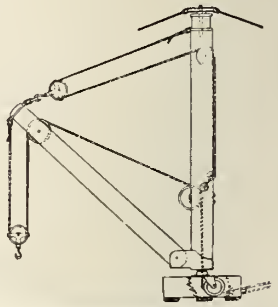

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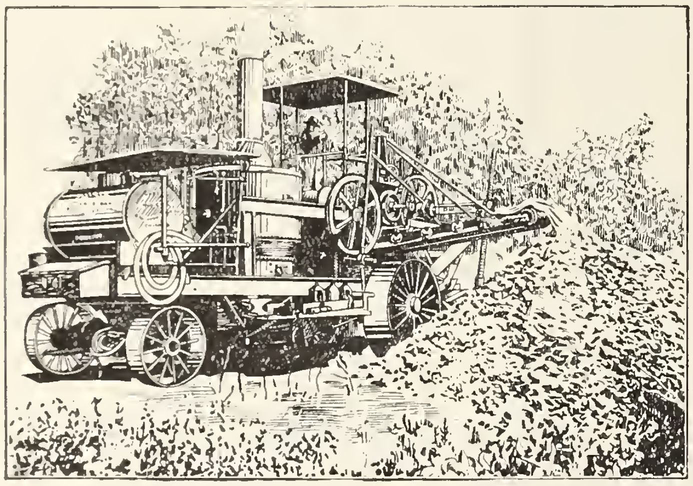

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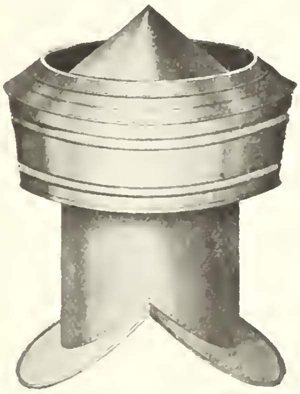

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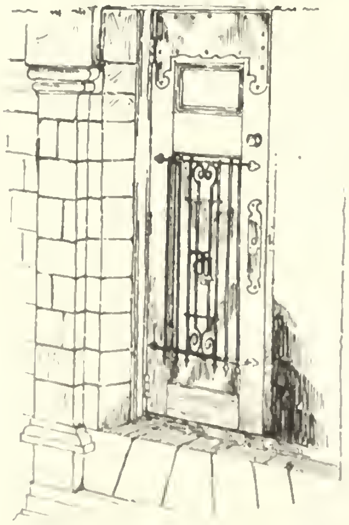

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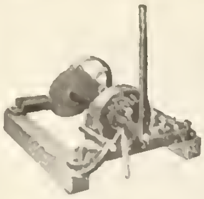

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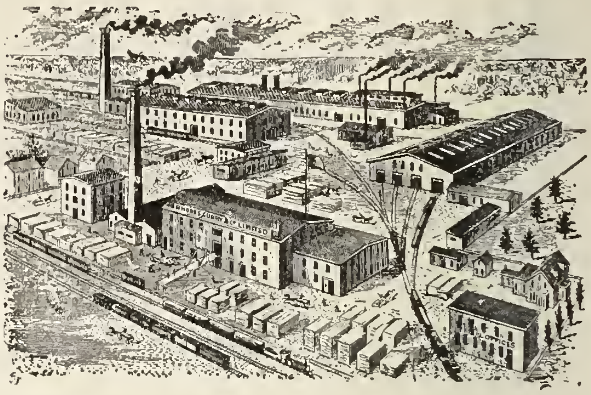

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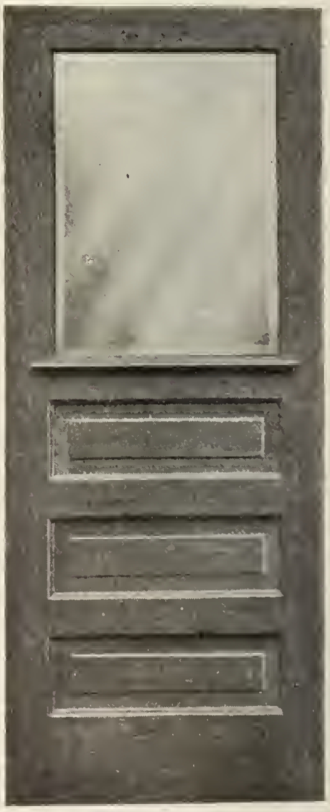

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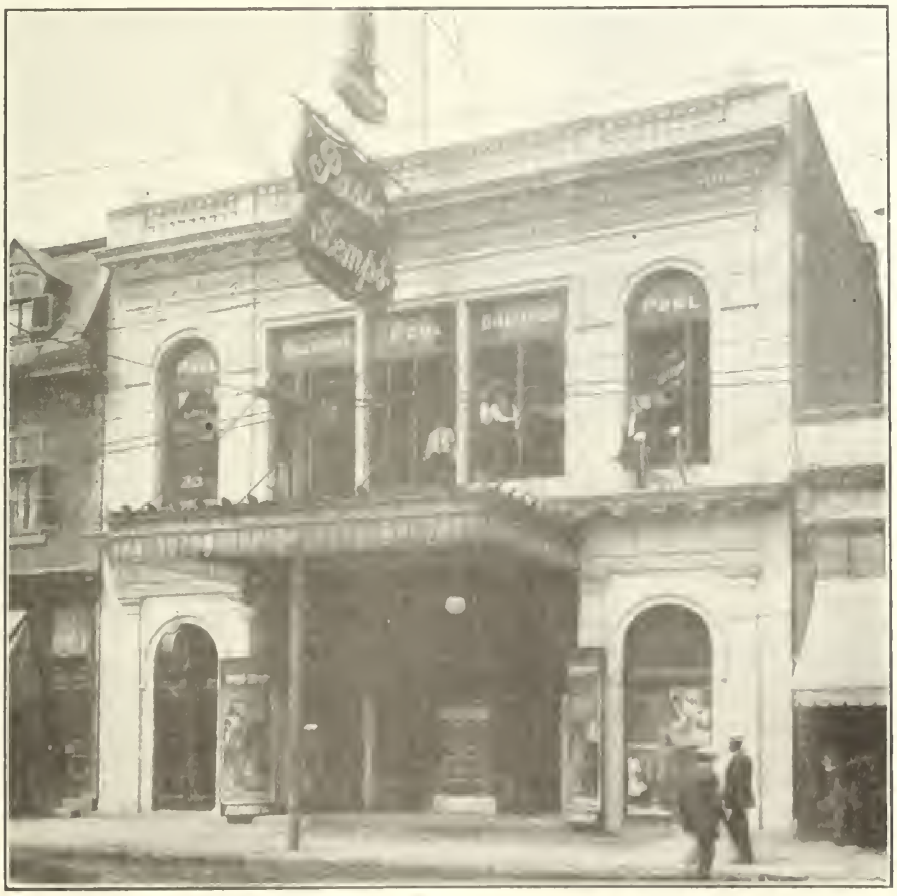

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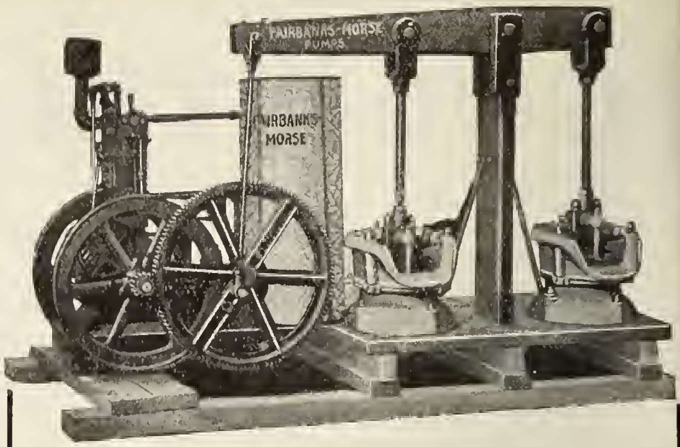

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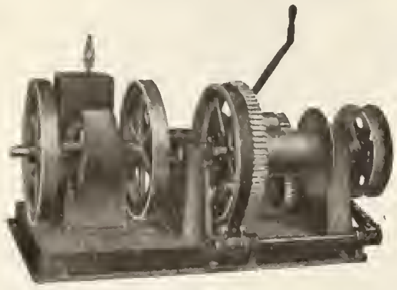

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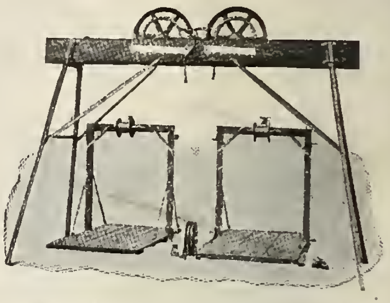

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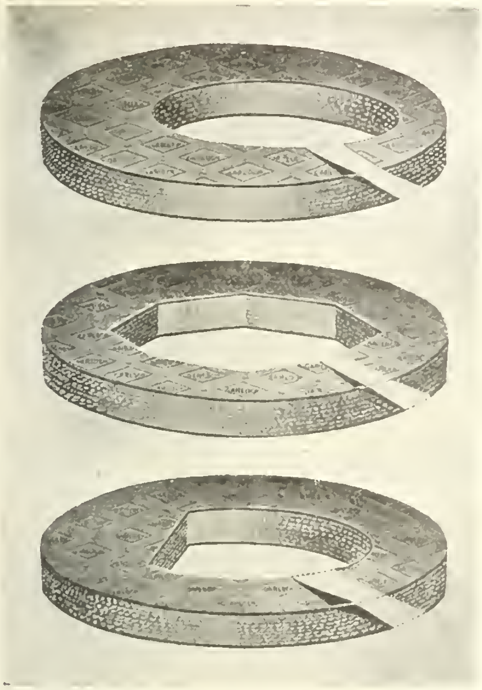

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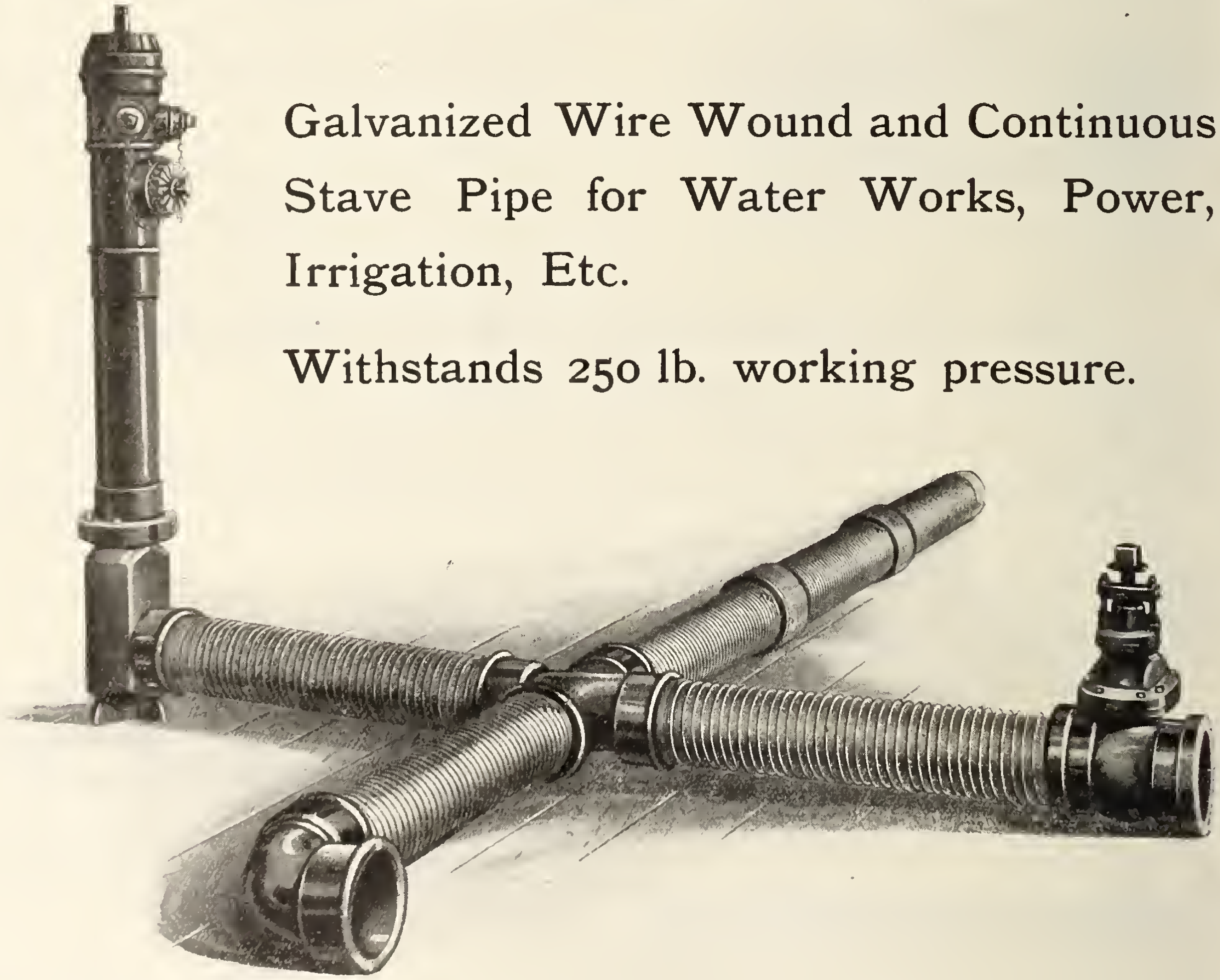

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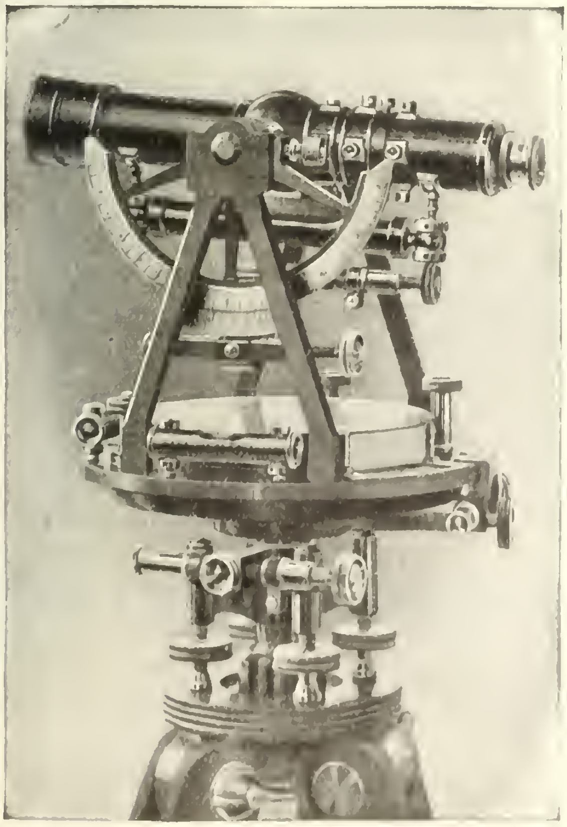

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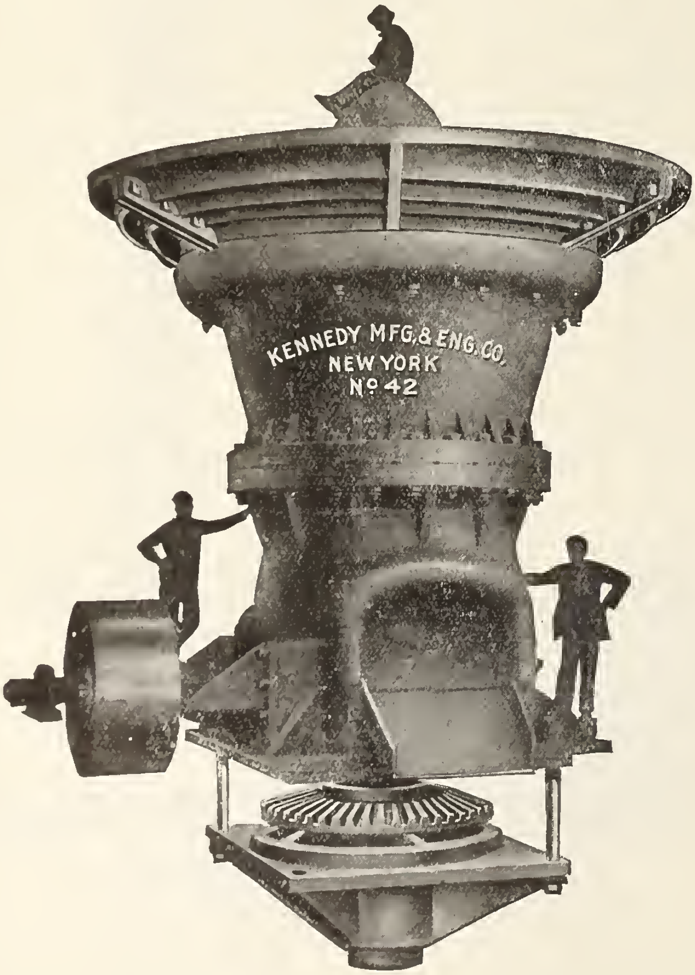

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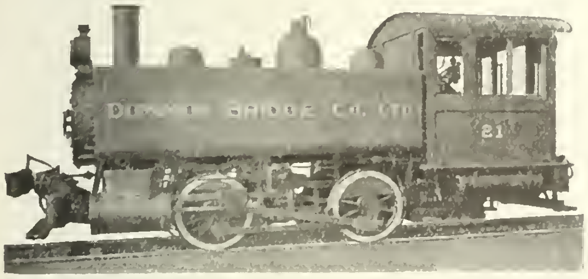

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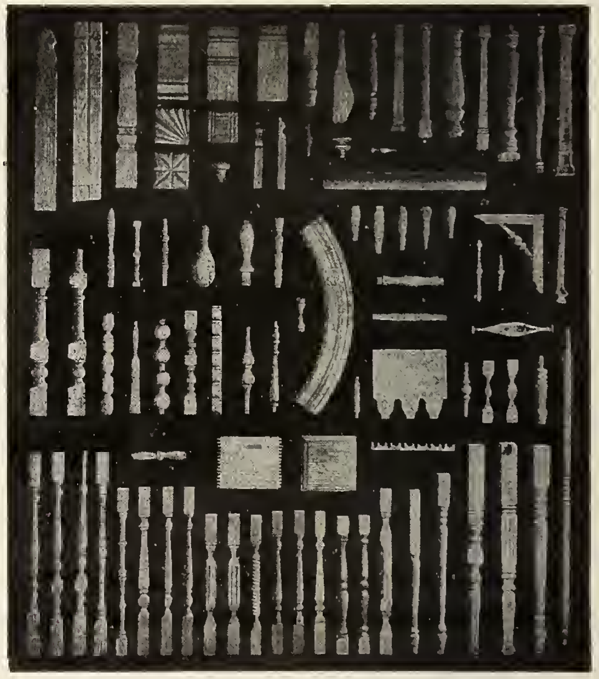

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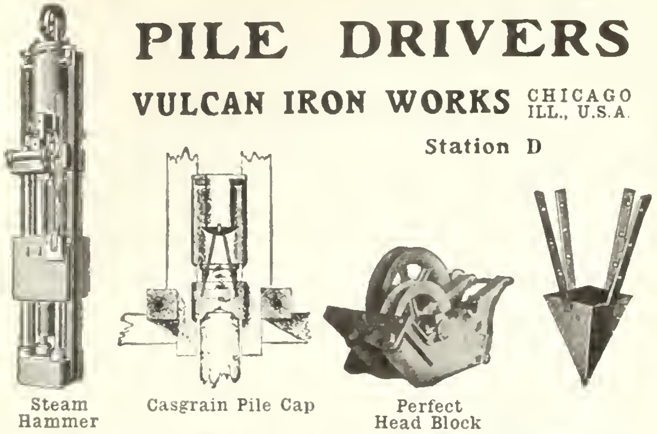

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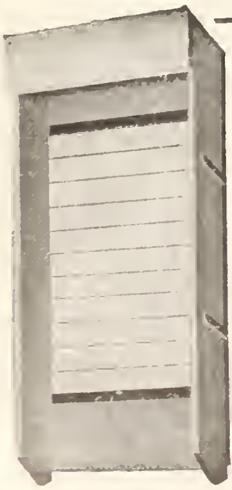

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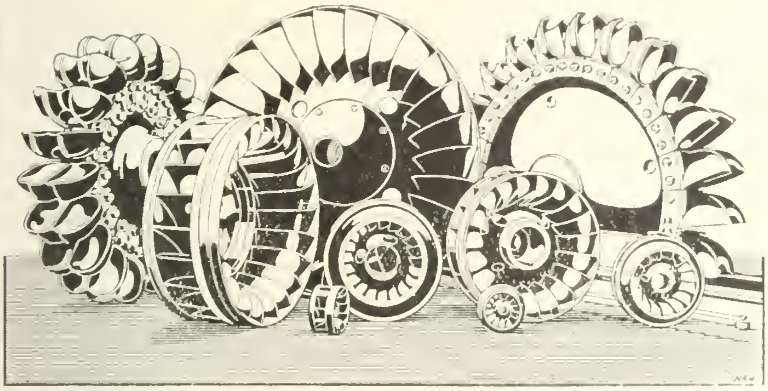

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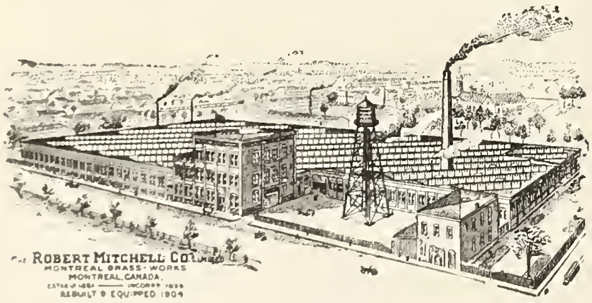
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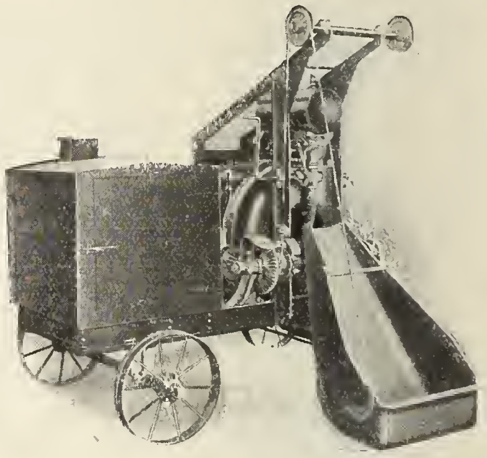

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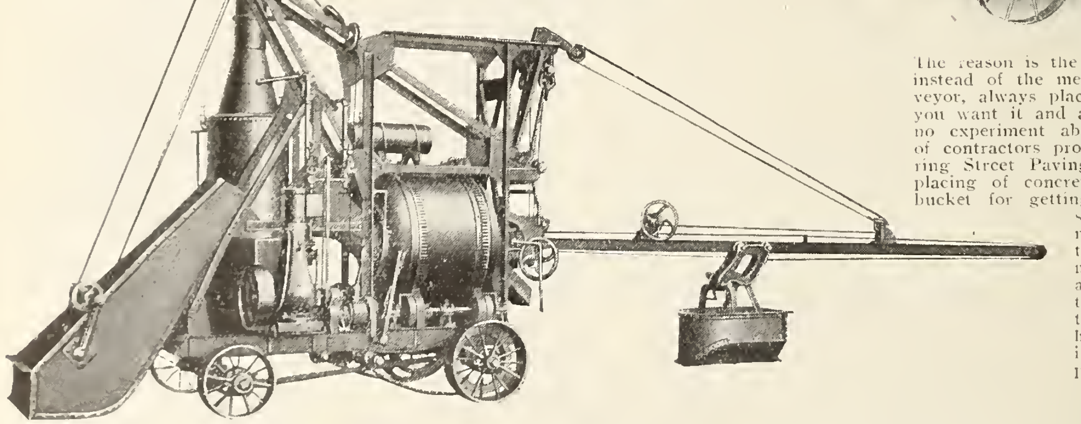

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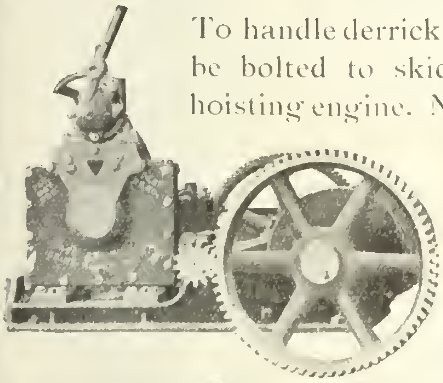

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Architect
Canada Life Building, Ottawa
Reinforced concrete and steel structures, factories and commercial buildings

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Driller of Oil, Gas, Salt or Artesian Wells
Deep Wells a Specialty
20 YEARS' EXPERIENCE IN CANADIAN OIL FIELD

Contracts taken in any part of Canada. Several years experience in Artesian Wells for Municipal Water Works. Estimates or geological information cheerfully furnished.
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Bank of Ottawa Building - Montreal, Canada

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We make a Specialty of

Water Power Construction, Power Plants, Dams

OUR SCOPE:

BRIDGE PIERS — DOCKS — DAMS — SEA-WALLS — MINING SHAFTS — WHARVES
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We Invite Inquiries in Reference to Cost and Design of Difficult Foundation Work.

Orleans Filtration Plant and Concrete Building taking about 100,000 barrels of Alsen's New Cement

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

Practical Cost Data on

Herringbone Metal Lath

The ceiling of the Power House of the Toronto General Hospital measures one hundred and twenty yards net. One hundred and twenty-two yards of **Herringbone Lath** covered it completely, waste and lap included.

This is not a record; it is a typical case. The Herringbone selvage edge is the reason.

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, **Toronto**
Metal Shingle and Siding Co., Manufacturers

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for Engineers and Contractors

We are manufacturers of a very complete line of tents for engineers' and contractors' use and can make shipment the same day as order is received.

We also make engineers' and surveyors' clothing, in fact we can fit you completely for camp and survey trips.

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It will interest you

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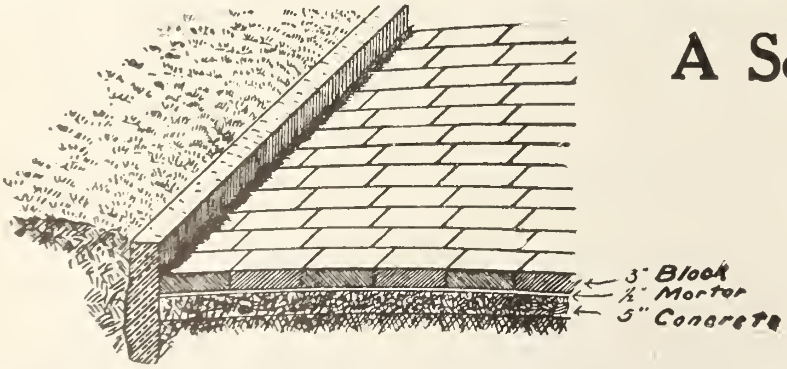

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Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
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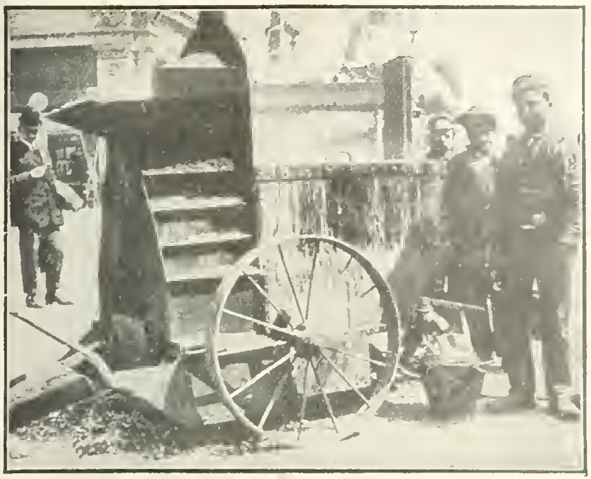

The Mullen Combination Tar Kettle and Gravel Heater

A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

Write us for particulars

Tide Water Iron Works
HOBOKEN, N. J., U. S. A.

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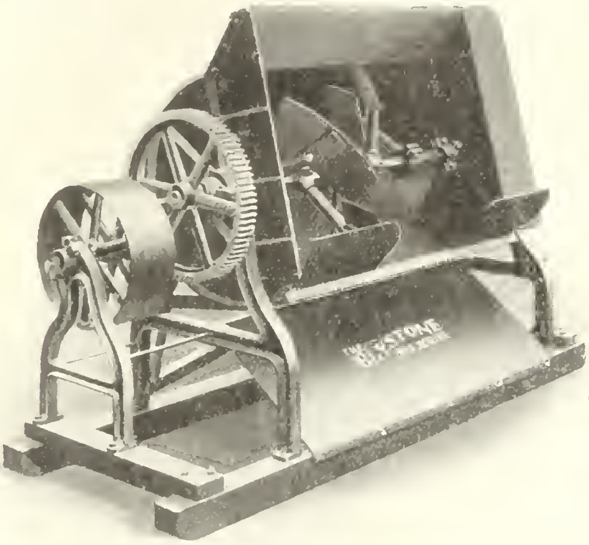

The Blystone Skid Mixer

The perfect design and construction of this mixer reduces the working cost to a minimum and effects the greatest ease in operation. All working parts are strongly made and will not get out of order.

Easy to work Easy to Clean High efficiency Low cost

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The Blystone Machinery Company
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Full line of Blystone Mixers carried in stock by
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MacLean Daily Reports Limited

TORONTO : MONTREAL : WINNIPEG : VANCOUVER

March 11, 1912 No. 106690
PREPARING PLANS 1st Rptd. 1/12/12

OFFICE AND BOTTLING WORKS $30,000
WATERLOO, ONT.

Owner, Kuntz Brewing Company, Waterloo, Ont.

Architects, Mildner & Eisen, 1018 Hammond Building, Detroit, Mich.

Two storeys and basement, 104 x 90, brick, fireproof, concrete and gravel roof, sheet metal, no skylights, steam heating, sanitary plumbing, electric lighting, patent plaster, wood lath, lead and oil paint, no elevator, conveyor system to be used, reinforced concrete floors, iron beams and girders, local cut stone, cement floors, common and wire glass, figured glass in offices, some pressed brick on front, metal sash, three vaults built in, plans provide for four steel storage tanks.

Probably ready for bids in April.

This illustrates the form in which firms in over two hundred **different** lines receive daily advice of opportunities for their getting business. Each subscriber receives reports relating to his business only. Charges are based upon the requirements of your own business. If you desire special information on any project we guarantee to supply you with a full report as soon as available from our reporters in the district mentioned. This special service is included in your contract. If you are a contractor or sell materials, supplies, furnishings or machinery your judgment will be to confer with us. Rate cards and sample reports on application.

MacLEAN DAILY REPORTS
Limited
220 King Street West, TORONTO

Montreal **Winnipeg** **Vancouver**

Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per M
No. 1 dry pressed red brick	$18 00
No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	11 00
Wire cut bricks for foundation work	11 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

LUMBER (Building Material)

Hemlock Lumber—

2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00

Pine—

1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pnie Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	

Pine trim for paint finish—

4 in. casing per 100 ft.	2 00
5 in. casing per 100 ft.	2 25
8 in. pine base, per 100 ft.	3 25
10 in. pine base, per 100 ft.	4 25
4 in. pine window stool	2 75

Shingles—

XXX B. C. Clear Shingles, per M.	3 60
N. B. Extras	3 50
N. B. Clears	2 90
No. 1 pine lath, per M.	4 75
No. 2 pine lath	4 25
No. 1 spruce lath	4 00

Cedar Posts—Fence—

5 in. at small end, each	25
7 in. at small end, each	35
Hemlock lath	3 25

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 per cent, for approved specifications:

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9 75
71 to 80 "	6 25	11 00
81 to 85 "	7 00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24 00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$3.25	$4.75
40	3.45	5.20
50	3 85	6.00
60	4.10	6.50
70	4.35	7.00
80	4 85	7 50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 per cent.

High grade compression work, 55 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 per cent., and 1 and 2 hasin cocks, 70 per cent.

Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.50

Square head brass cocks, 70 per cent.

Lead Pipe

Lead pipe, $7.50 net; lead waste, $9.25 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$1.93	¼ inch	$2.75
⅜ "	1.93	⅜ "	2.75
½ "	2.55	½ "	3.49
¾ "	2.99	¾ "	4.14
1 "	4.29	1 "	5.94
1¼ "	5.85	1¼ "	8.10
1½ "	7.02	1½ "	9.72
2 "	8.82	2 "	12.42
2½ "	14.09	2½ "	19.84
3 "	18.50	3 "	26.05

Malleable fittings—Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 70; nipples, 4-inch diameter and under, 80; nipples, 4½ inch and up, 75; malleable lipped unions, 65 and 10 per cent

Plain steel bars, $2.05.

Square twisted bars, ½ to 1¼, $2 15.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6 inch, 70 per cent.

7 and 8 inch pipe, 50 per cent

Sewer Pipes

4 in	25c ft	15 in	1 35 ft
6 in	40c ft	18 in	1.90 ft
9 in	65c ft	20 in	2.25 ft
12 in	1 00 ft	24 in	3 25 ft

all less 60 per cent

CEMENT, STONE, STEEL, Etc

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1 80

Cement, wholesale, car lots, f.o.b. Toronto bags extra, $1 55

Crushed stone, 2 inch, $1 30, 1 inch, $1 35, [illegible] inch $1 15

Binder stone, $1 30 per ton, f.o.b. Toronto

Burnt River rubble stone delivered $15 to $16 per toise

Free stone delivered, $15 to $16 per toise

Brown coursing stone, delivered $3 25 to $3 50 per yard

Grey coursing stone, delivered, $2 25 to $2 50 per yard

Sand, for cement or brick work, $1 15 a yard, f.o.b. cars, Toronto siding

Brown sills and [illegible] delivered 40 cents per foot

Rubble stone in car lots $1 30 per ton

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, 9.00 in car lots.

Lime, per cwt., delivered, not less than 1,500 lbs., 33 cents; white, 43 cents.

Plaster of Paris, Anihor Brand, $1.50.

Manilla Rope, best, per pound, 12½ cents.

PAINT AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $9.00 per 100 lbs

Boiled Linseed Oil, in barrels, 82c ped gallon.

Raw Linseed Oil, in barrels, 79c per gallon.

Turpentine, in barrels, 59c per gallon.

Pure Red Lead, dry, $7 to $8 per 100 lbs.

Putty, pure linseed oil, in bulk, bbls., 3½c.

Putty, pure linseed oil, in 25 lb. tins, 4c.

McMYLER DERRICKS FOR SALE

Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turn over buckets, two (2) marine engines, boilers-fuel lighter with whirley aboard. Address

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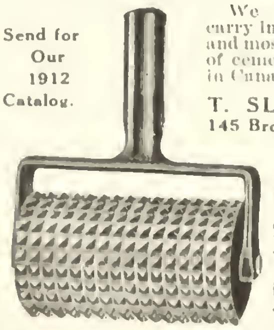
Cement Sidewalk Tools

Send for Our 1912 Catalog.



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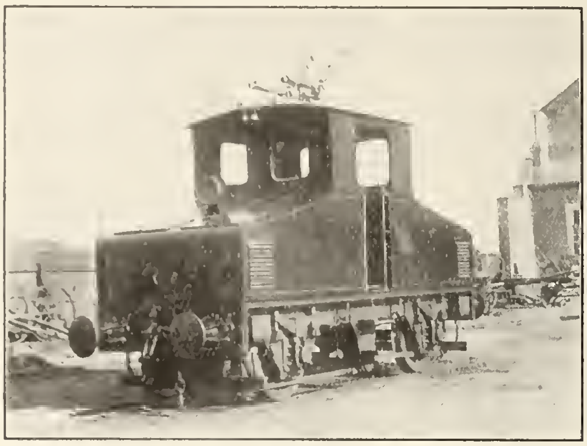

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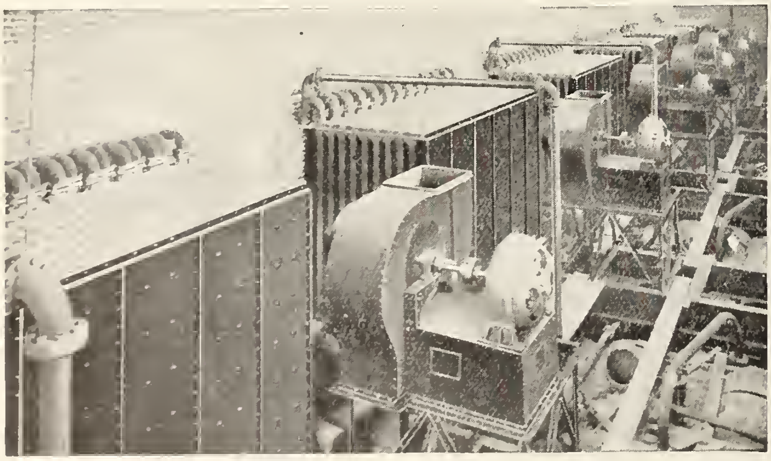
Simplicity **Foolproof** **High Efficiency** **Patent Single Phase Motor** **High Starting Torgue**



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All working in connection with 6 Sterling Boilers 4200 B. H. P.

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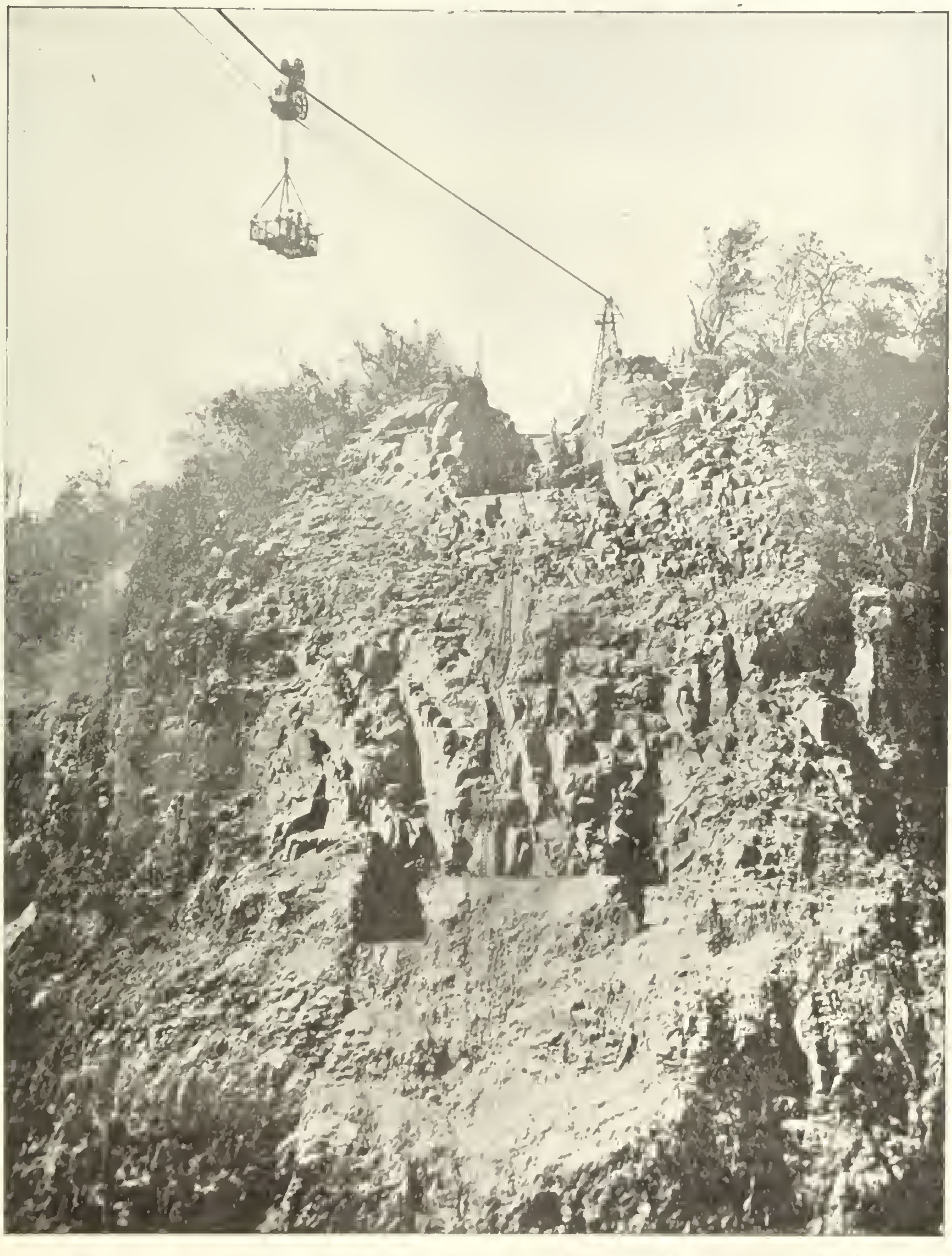

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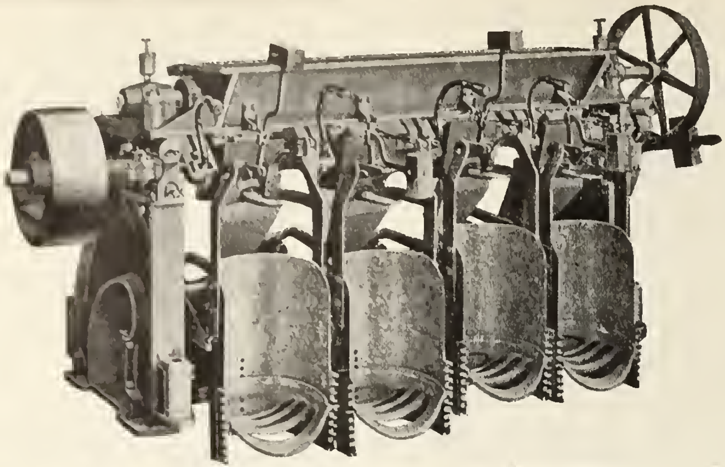

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Minerva Irish Felt—Considered by Engineers the best waterproofing medium in foundation work where pressures are to be met.

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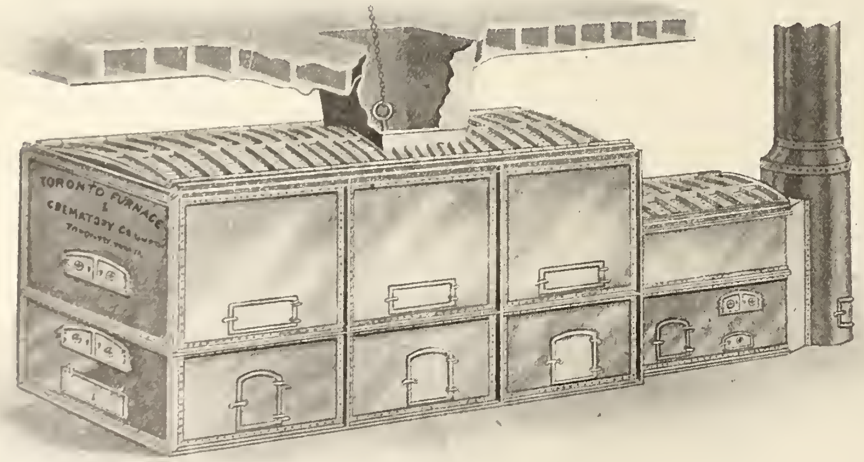
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ADAPTED FOR TOWNS AND CITIES FROM 3,000 TO 500,000 INHABITANTS.

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Special types of burners designed for any class of work and all sizes and capacities to suit the requirements.

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Possible with RENFREW LIME and you can lay 200 more bricks a day.
"RENFREW" will make more mortar per 100 lbs. of lime, and it sets very hard.
Bricks are easily bedded down when "RENFREW LIME" is used.
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In this Number: Montreal, the Commercial Metropolis

ESTABLISHED 1886

Contract Record and Engineering Review

Vol. 26 Toronto, October 23, 1912 No. 43

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WATER PIPE
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for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
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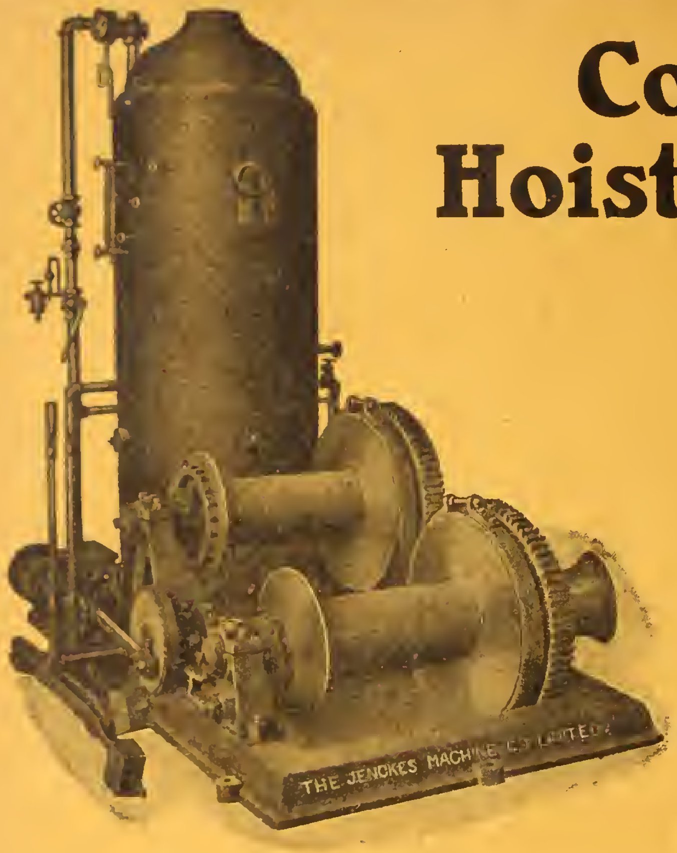
Office and Factory, Granville St., near High Bridge
WRITE FOR CATALOGUE
Full Particulars and Estimates Furnished



Contractors' Hoisting Engines

¶ Especially designed to fully meet the peculiar requirements of Contractors' work.

¶ Great care has been taken to secure maximum strength and rigidity without unnecessary weight.

¶ Built in all the popular sizes.

¶ Full particulars and prices to interested parties on request.

**The
Jenckes Machine Company
Limited**

General Offices: Sherbrooke, Que. Works: Sherbrooke, Que. - St. Catharines, Ont.
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---

No Other Hoisting Engine Built

can do as much severe work as the

"AMERICAN"

It does its work with less human power, fuel, wear and expense, and with greater speed and accuracy than any other similar engine on top of earth.

When you need a Hoisting-Engine, let us prove these claims to you.

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ST. PAUL, MINN.

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Concrete is the best and cheapest material for permanent paving of city streets as well as for country roads.

$$\frac{\$1{,}000}{\$6} = 166.6 \text{ miles.}$$

The cost of keeping a mile of macadam road in good condition for one year will pay for the maintenance of $166\frac{2}{3}$ miles of concrete road for same period.

The first concrete road was built in Bellefontaine, Ohio, nineteen years ago. The cost of maintenance has averaged **$6 per mile per year.**

Six years ago New York State started to build 12,000 miles of macadam road. Fifty million dollars was voted for the work. To date, 3,674 miles have been improved, and $49,000,000 has already been spent—or over $13,000 a mile—and the present cost of maintenance, only six years after the first mile was built, is **$1,000 per mile per year.**

Is it any wonder that the New York Road Commission, in asking for another fifty millions, has promised the people to spend it for concrete highways?

Wayne County, Michigan, has built 33 miles of concrete roads since 1909, and the farmers of Wayne County are so well satisfied that they no longer consider macadam roads.

Canada's era of road building is just beginning. Will she profit by the experience of these other commonwealths? Will she spend her road money on roads that constantly need repair—or will she build permanent roads?

The engineers of our Free Information Department will gladly supply any information on concrete highways that is desired, without cost or obligation to the enquirer.

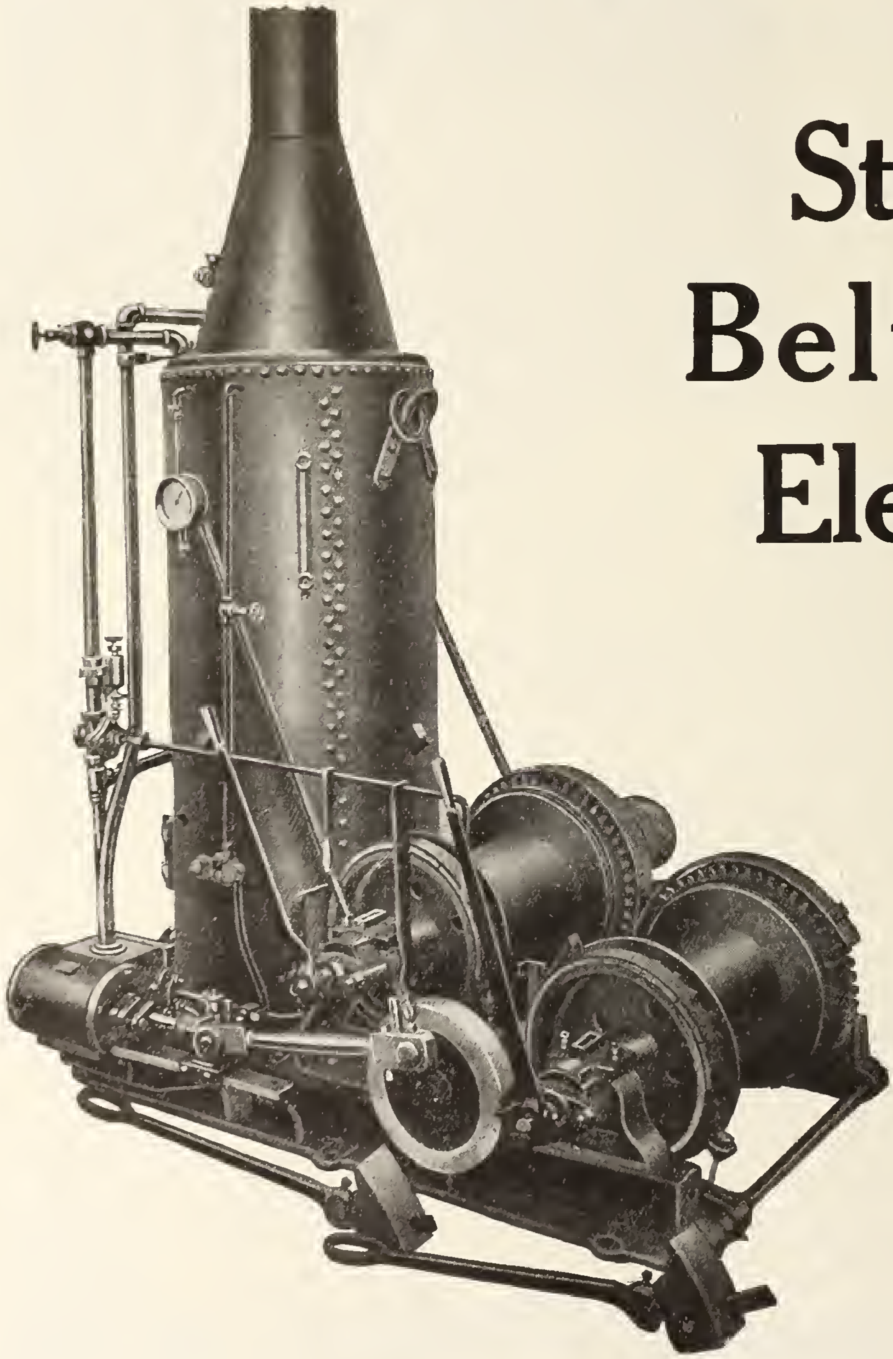
Canada Cement Company, Limited

Head Office - Montreal

Sales Offices at

Montreal Toronto Winnipeg Calgary

Hoisting Engine



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All sizes for all pu
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Special outfits c
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Standard sizes ca
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Special Hoisting
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meet your require-
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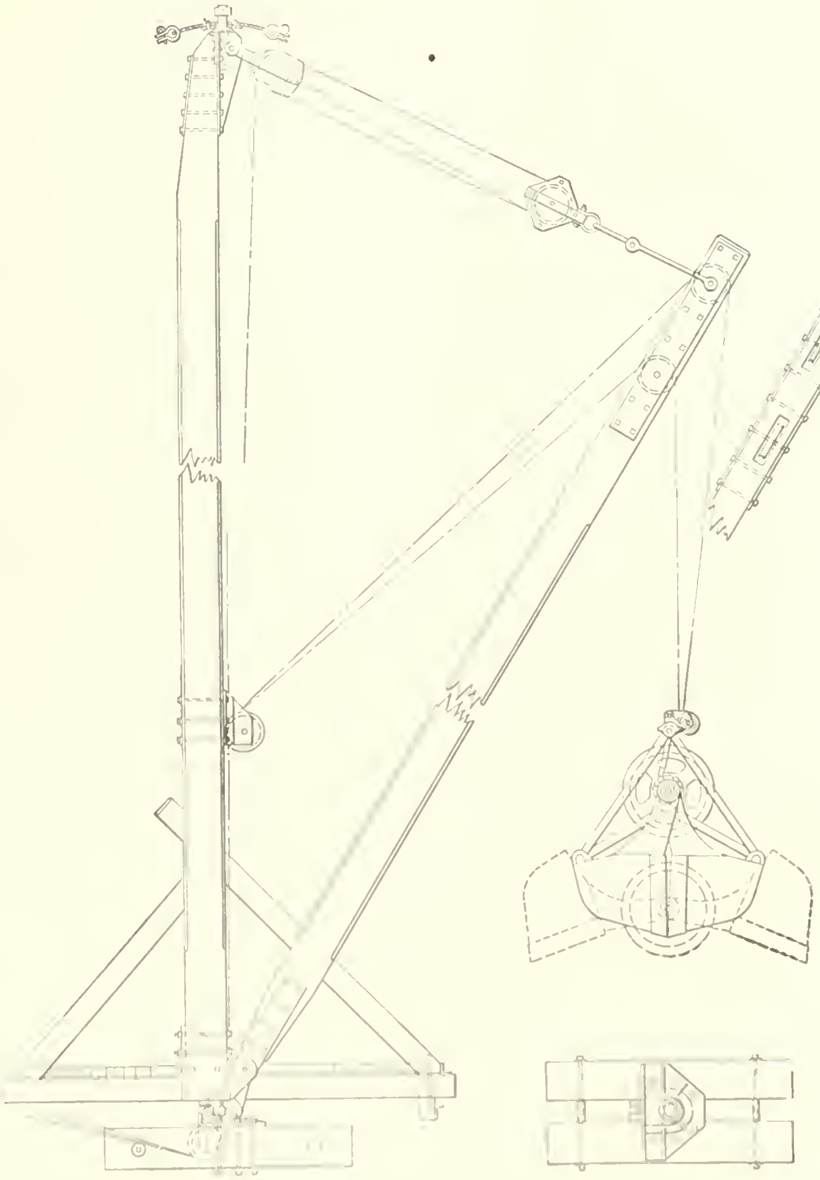

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(Continued on page 12)

Don Valley Products Combine Safety and Beauty

Bell Telephone Building, Toronto

Don Valley Porous Terra Cotta Fireproofing renders a building absolutely safe, and Don Valley Bricks have the beauty of appearance that is so necessary a factor in present day construction. A striking proof of the high estimation in which Don Valley Products are held by Canada's foremost architects is furnished by the numerous buildings in which they have been used; these buildings being, in many cases, the finest of their kind in Canada.

"SPECIFY DON VALLEY PRODUCTS"

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO

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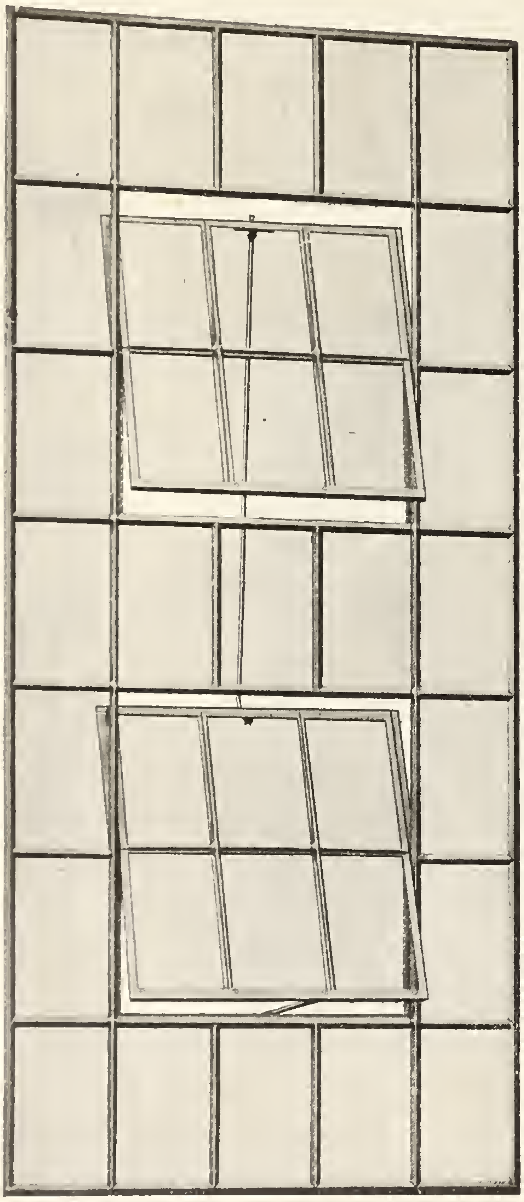


"Fenestra"

"Fenestra" TRADE MARK

Solid Steel Sash

will afford

More Light—Better Ventilation

in any building where they are installed. "Fenestra" is a high-grade steel patented joint sash—it takes up minimum space and permits the maximum passage of light through the window.

"Fenestra" Solid Steel Sash requires no frame, sash weights or heavy mullions—the cost is thereby reduced so that the price compares favorably with the price of wooden sash even when the price is higher it is more than compensated for by the enormous advantages gained in

Strength, Durability, Handsome Appearance,
Weather Proofness and Fire-resisting Qualities

Besides that consider the permanence of steel as compared with wood and remember that with "Fenestra" Solid Steel Sash you save all the up-keep costs entailed by wooden sash and frames—in a big building that is a big item.

"Fenestra" Solid Steel Sash

proves itself an economy wherever used but is particularly suitable for

Factories, Foundries, Power-Houses, Prisons
Railroad Shops, Warehouses, Barracks, etc.

We will help you to settle the problem of your window requirements—write us.

STEEL and RADIATION, Limited

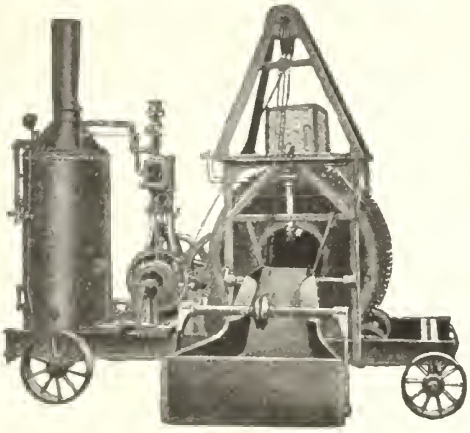
TORONTO, CANADA

Have You Seen Our 1912 Catalogue on Concrete Machinery?

London Automatic Batch Mixer No. 1

It's a dandy 160 pages illustrations.

Showing the Largest Line of Concrete Machinery ever crammed into a catalogue.



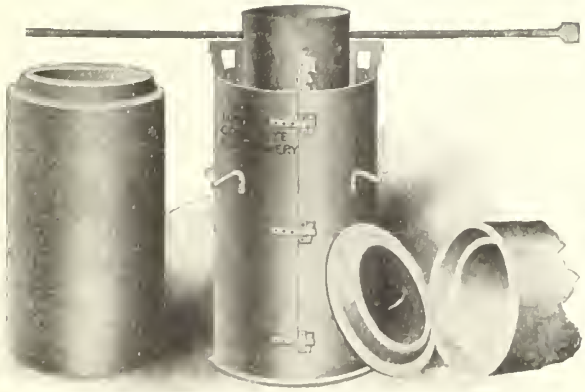
London Standard Drum Batch Mixer

All Made in our Own Factory and under a system producing an Excellence of Quality. Our large output Right from Factory to the Contractor.

Even such remarkably low prices are preferable to exorbitant prices and small output

Some people wonder how we can sell high grade machinery at such low prices

IT IS QUITE SIMPLE



London Sewer Pipe and Tile Moulds

We manufacture over twenty different sizes and styles of
Concrete Mixers
Mortar Mixers
Concrete Block Machines
Cement Brick Machines
Cement Tile Machines
Tile Moulds
Rock Crushers
Screen Sand Elevators

Our Enormous Sales and Small Profits are Sufficient Explanation.

London Paving Mixer with Side Lift and Rear Discharge

Gasoline Engines
Pumping Outfits
Steam and Gasoline Hoists
Material Elevators
Sidewalk Forms
Sidewalk Tile Machines
Concrete Carts
Wheel Barrows
Sill Step and Window Cap Moulds
A complete line of Cement Working Tools

London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

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B. C. Equipment Co., Vancouver, B. C.
G. B. Oland, Halifax, N. S.
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We are the Largest Manufacturers of Concrete Machinery in Canada

For That Rush Job

you must have an equipment that works ***quickly*** and ***well***—that saves money and labour. Do you want an immediate delivery of a mixer that will see you through your rush contract on time, do the best work always and economise right along the line? Then come and see the

Wettlaufer Improved Heartshape Mixer

It will help you to make yours a more profitable job

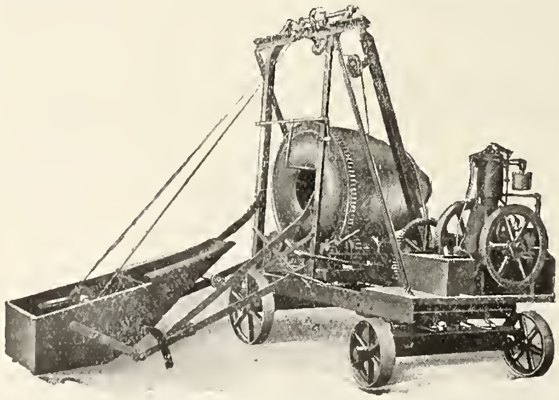
Strong Construction

Automatic Operation

Low Working Cost

Quick Loading

Clean Dumping



Wettlaufer No. 1 Heartshaped Mixer

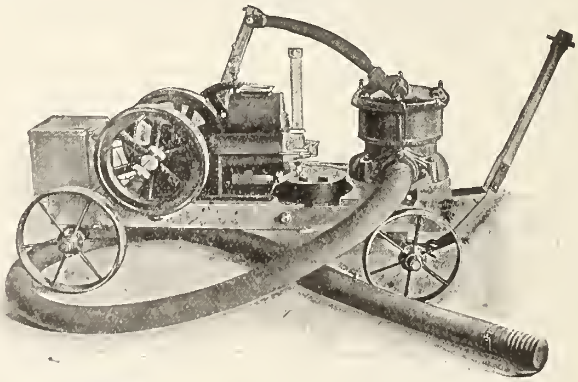
Rapid and Perfect Mixing

Increased Capacity

Minimum Repairs

Long Life

The Most Efficient Pump for Abutments and Foundations



Wettlaufer New Gasoline Driven Water Pump

Capacity 2,000 gals per hour

Does the Work of Two Men

Full particulars and Catalogue on request. Continuous demonstrations at

WETTLAUFER BROS.

FACTORIES : **Mitchell, Ont.** **Buffalo, N. Y.** **Detroit, Mich.**

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Winnipeg, Man.

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Steelcrete

The most perfect system of concrete reinforcement on the market. Expanded Metal Cold Drawn—gives maximum stiffness, strength and high elastic limit.

ROGERS

Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

All

Fire Proofing Material

used by the

Building Trade

supplied by

ALFRED ROGERS LIMITED

28 King St. W., TORONTO, Ont.

N. J. Dinnen & Co.

WESTERN SALES MANAGER

WINNIPEG

Man.

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery — Send your orders for crushed stone to

ROGERS

French Caen Stone Cement

Monarque Brand and Cementaline. Rich in appearance and of unlimited durability, as good as natural stone—but cheaper. Full particulars of

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Brantford Roofing Co.
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Canadian Mineral Rubber Co.
Canadian Supply Company
Metallic Roofing Co.
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Paterson Mfg. Co.

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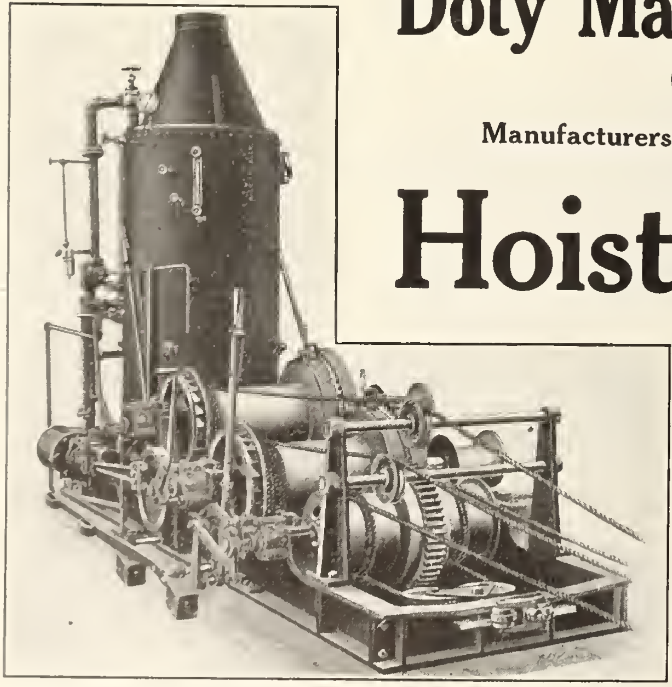
The
Doty Marine Engine & Boiler
Company Limited
Manufacturers of **Superior**
Hoisting Engines



This cut illustrated our Standard Double Cylinder Double Drum Hoisting Engine with Derrick Swinger attached. "Superior to any other on the market." All parts constructed, guages and templates and every engine tested under steam.

Derrick Swingers, Material Elevators, etc.

for

Contractors, Mines and Quarrymen

A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

Works—GODERICH, ONT.

To buy our Engines is a Guarantee of Satisfaction

Sawyer Belts

— Stretched in the Making

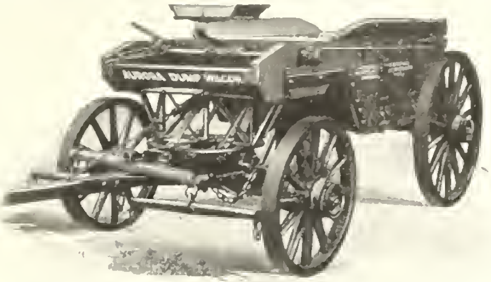
Fabric belts are liable to stretch—but Sawyer will not stretch excessively because the stretch has been taken out in the making.

We fully realize the importance of this item to the user and have taken care to insure our belt against this criticism. We guarantee our belt not to stretch excessively if properly placed on the pulleys. Write for further information in our book No. 3.

Sawyer Belting Co.
Cleveland, Ohio

THE STRENGTH OF OAK WITH 40 PER CENT SAVING IN WEIGHT

That's the saving effected by constructing the bed of selected Washington Fir, and its just one of the many reasons why lightest weight is combined with greatest strength in the



"Aurora" Dump Waggon

Built low for easy loading, coupled short for lightest draft only 7 feet 4 inch wheel base.

Chains entirely outside of bed, direct pull of chain on doors and length of chains adjustable.

Slotted hinges on doors give vertical movement, preventing installing team on dump.

Study its sturdy construction—its mechanical, labor-saving and dependable qualities. Catalog for the asking.

Western Wheeled Scraper Co.
AURORA, ILL.

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS

1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

Total $376.17 or $5\frac{2}{3}$c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.

Hagersville, Ont. **Limited**

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  - Sheldons Limited
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  - McDougall Caledonian Iron Wks
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  - Dominion Steel Castings Co.
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  - Provincial Steel Co.
- Steel Bars
  - Canada Steel Co., Ltd.
  - Factory Products
  - Steel Co. of Canada
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- Stone Saws
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- Structural Iron and Steel
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  - Factory Products
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For Asphalt Macadam Roads, Asphaltic Concrete, Sheet Asphalt Paving—and Filler for Brick and Block Pavements

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Tarvia

Preserves Roads
Prevents Dust~

Section of Government Parkway, Ottawa, Canada, treated with Tarvia B

The Property Owner's Investigation

IN the City of St. Thomas, Ont., the property owners on Gladstone Avenue contemplated petitioning the City Council to improve the roadways. They commissioned one of their number to visit various American cities, inspect pavements and make a report. Their investigator, Mr. E.A. Horton, visited various cities in New York and New Jersey. In his report he made the following statements:

> "I saw a 'Tarvia X' road in Rochester which extends from the city to the lake front, a distance of about six miles. It had been in use for eighteen months, and when I saw it, it was in excellent condition, with heavy traffic over it every day. I........inspected a piece of road in Newark . ...the surface when finished was smooth, and to my mind was one of the finest pieces of road it was my privilege to see. We then inspected another piece of "Tarvia X" which had been done by the Road Commission two years ago ———Constant heavy traffic passes over this road every day, and trucks have loads of from 6 to 8 tons. Steel-tired drays were used with most of their heavy traffic This piece of road, as I saw it, did not show any wear whatever, and was apparently in as good condition as when it was put down.
>
> "I did not confine my attention to Tarvia roads as I saw (here he mentioned five of the commonest types of road treatment) and every other kind of road that is known
>
> "I must say after making enquiries from people who were in no way interested, nor did they know I was seeking information, that everyone had a good word to say for the Tarvia road I have no hesitation in recommending it for use on our street, and at the estimate cost that has been given us, after seeing the many pieces of road that I have seen, I think it is the cheapest road that can be built "

The foregoing is quoted from the St Thomas, Ont., Journal of February 20th, 1912 Since that date Gladstone Avenue has been constructed with "Tarvia X."

Anyone who will investigate the road problem with the same thoroughness will reach similar conclusions Tarvia is made in three grades

"Tarvia X" for use in constructing roads and pavements

"Tarvia A" for hot surface applications

"Tarvia B" (applied cold) for dust prevention and road preservation

Booklet describing the latest developments in methods for building tarviated roadways and pavements will be sent free on request Address our nearest office

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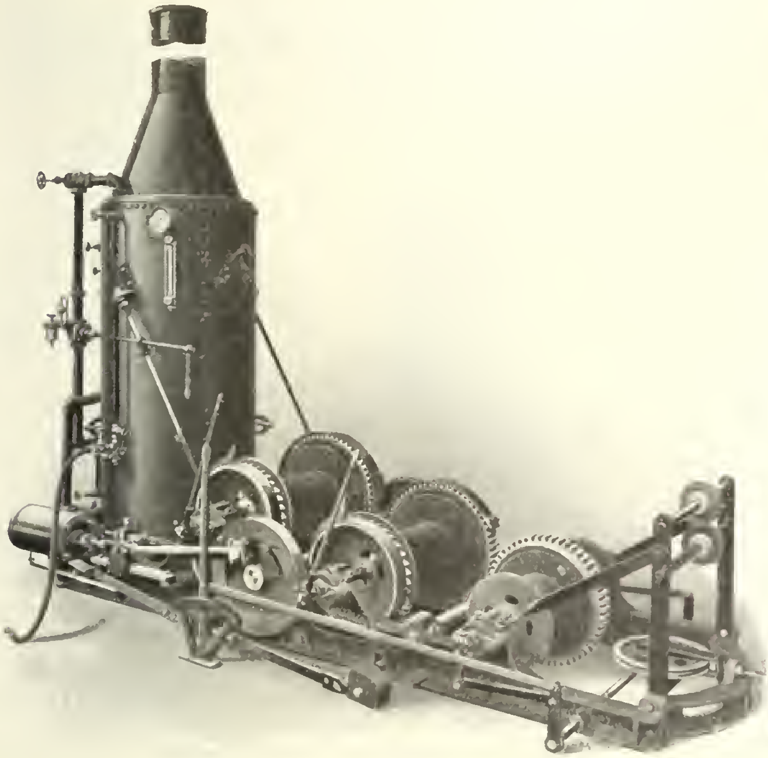

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Hoists and Priestman Grabs make a good combination. They can be seen at our Montreal show room at 335a Craig Street West.

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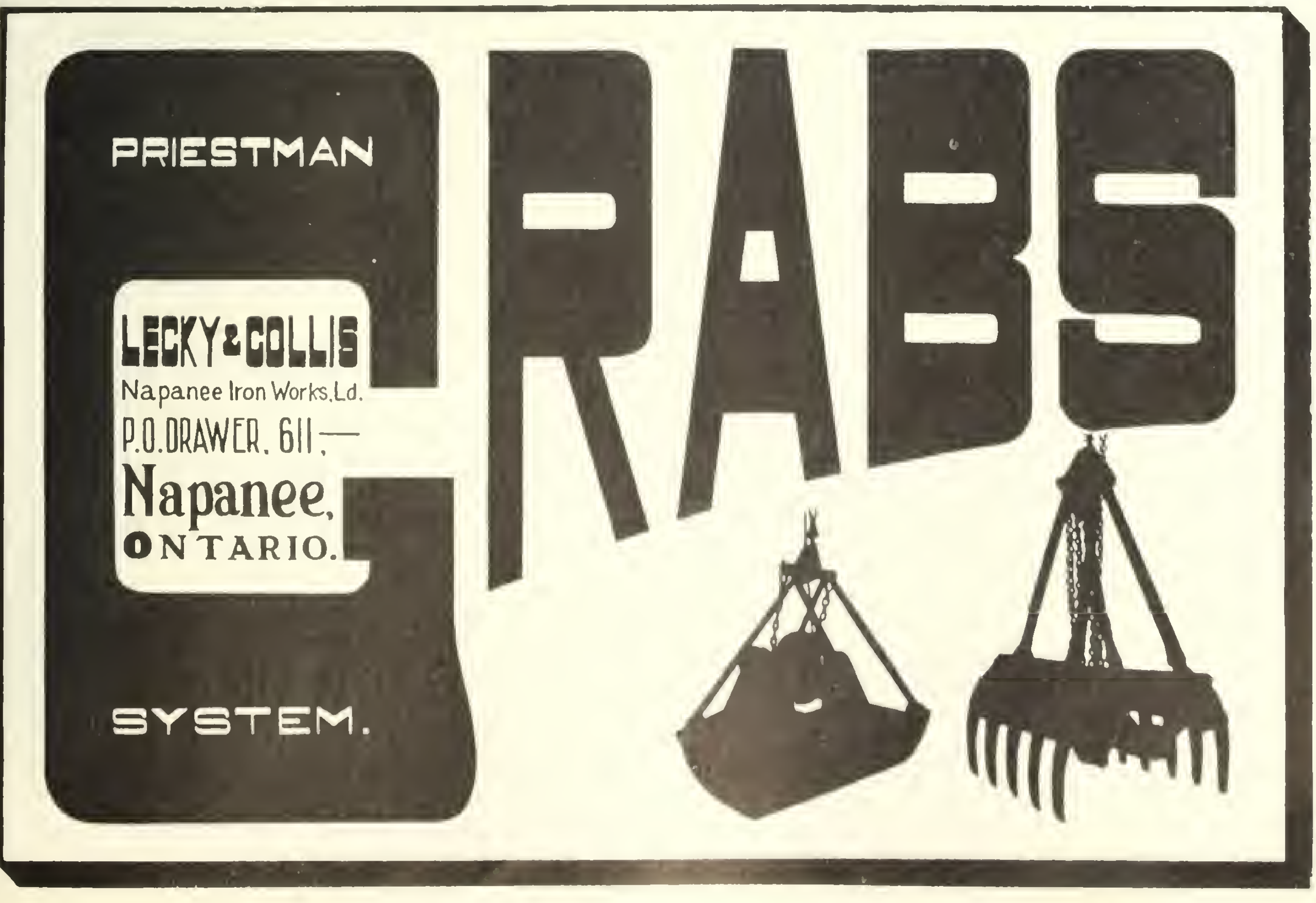

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LECKY & COLLIS
Napanee Iron Works, Ld.
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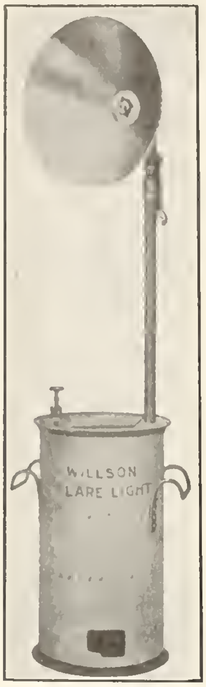

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8,000 Candle Power, operates 12 Hours on 18 lbs. Carbide.

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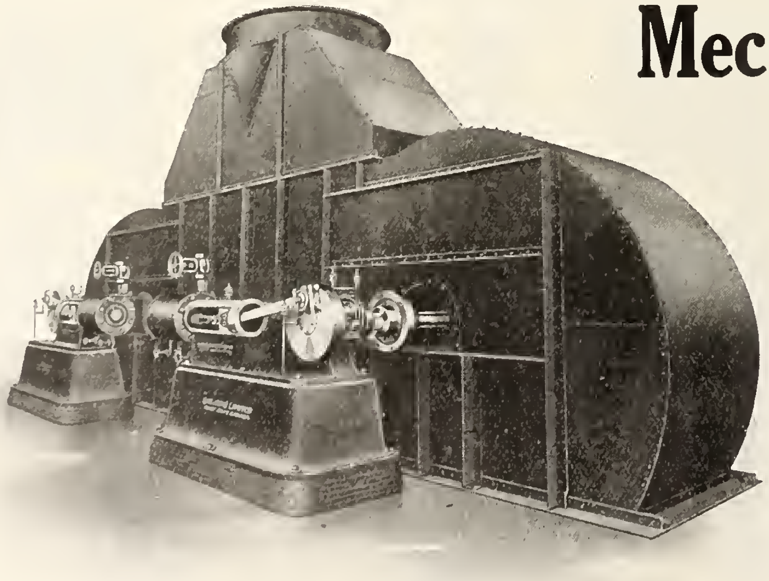

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Higher Efficiency

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"TOXEMENT"
"CEMENT FILLER" and "CEMENT FLOOR PAINT"

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ESTABLISHED 1848

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For backing limestone, granite and other building stones. Absolutely prevents any interior acid, alkali, rust or moisture from reaching the surface of the stone.

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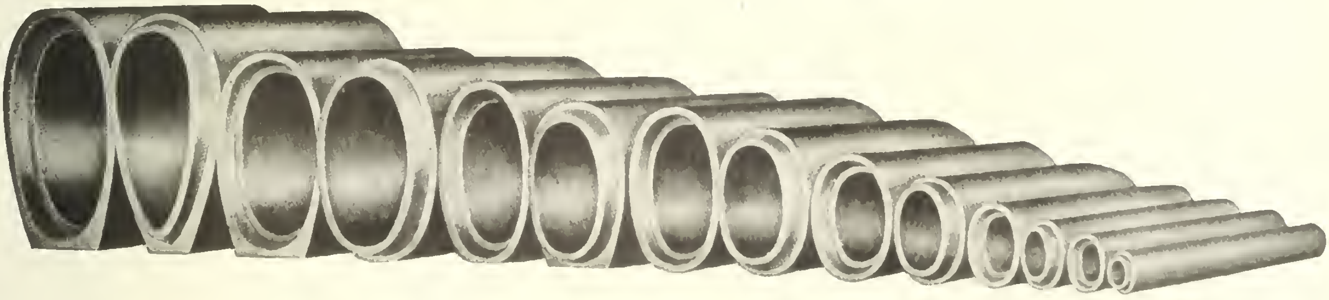

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LAST FOREVER.

OUR MATERIAL, SYSTEM and PRODUCT have been tested and approved by EMINENT ENGINEERS. NO RUST, NO ROT, NO FROST-BREAKS, NO PRESSURE-BREAKS, NO HIGH PRICES, NO DELAYS IN PROCURING, NO TROUBLE IN HANDLING.

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Patronize Experienced and Reputable Manufacturers.

Catalogue and prices on application.

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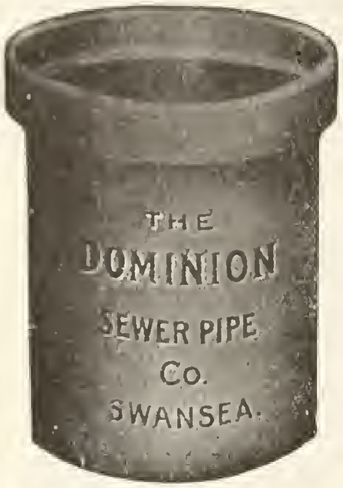

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SEWER PIPES

True to Size.
Impervious to Water.

Sizes manufactured and always in stock 4 in. to 24 in.

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Chimney Tops
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Telephone (Toronto Connection)
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The

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Two Factories:
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SOLE producers of the Beautiful Royal Dominion marble quarried at South Stukely, Que. A card or 'phone call will bring our representative to submit figures on any class of marble work. Address all letters to the Company P.O. Box 1166, Montreal.

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Can be operated at the lowest possible cost for Power by the use of the

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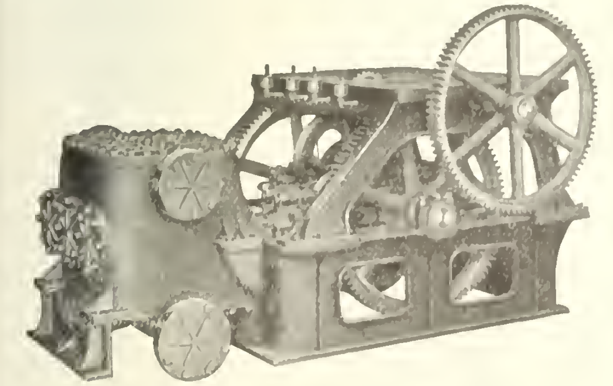

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Expansion Bolts and Screw Anchors

for making fastenings to brick, concrete and tile—you will save time and expense.

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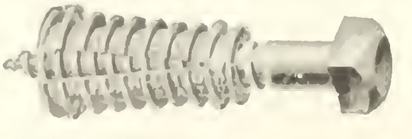
Sebco Products may be had from dealers everywhere; they are made of malleable iron, brass and of lead composition; in all sizes from 1/8" to 2" in diameter.



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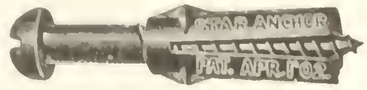
We also manufacture a complete line Toggles, Concrete Inserts, Drills and other fastening devices.



Star Expansion Bolts

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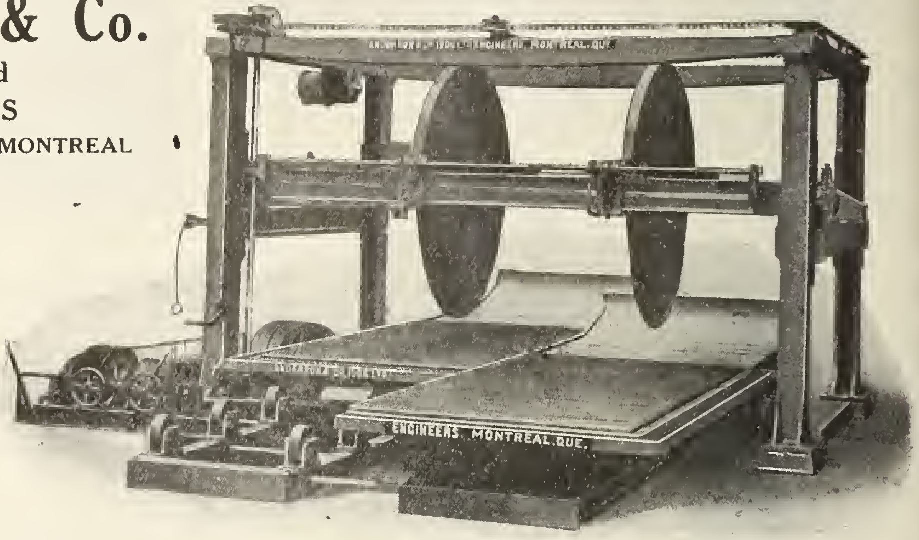
10 H. P. to 150 H. P.



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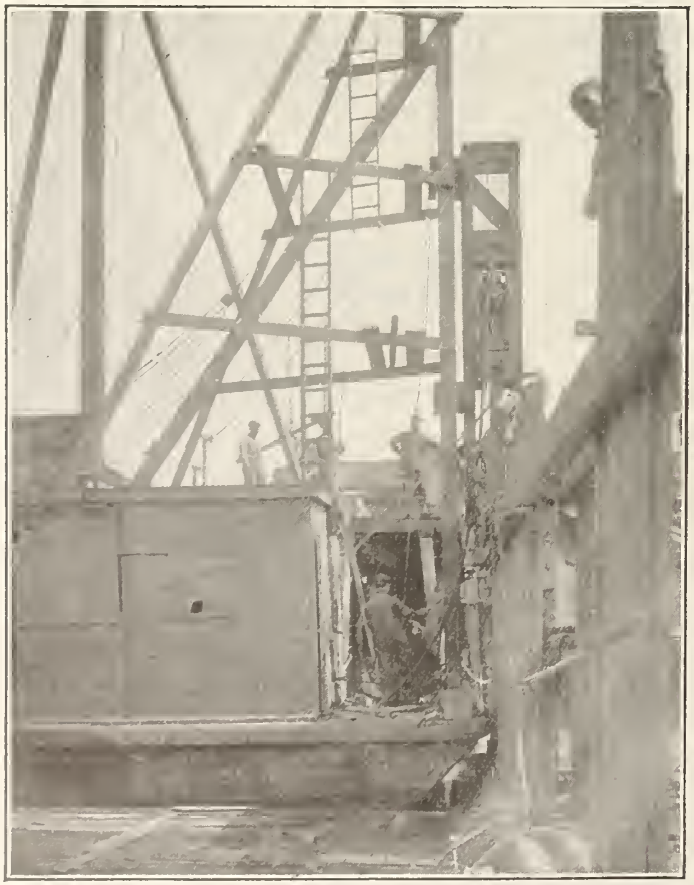
About 50 of the above Machines at work in Canada



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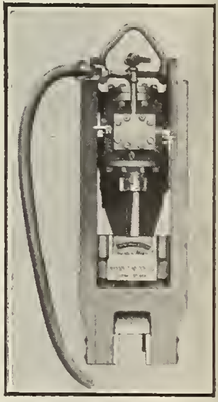

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TRADE MARK

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Is the only manufactured stone which can be cut and dressed, to give the same appearance as NATURAL STONE.

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W. E. Binning, Esq., Architect, Listowel. For Ornamental work such as above, Corinthian Stone is the best. For quality, price and workmanship, it has no equal. Specify it.

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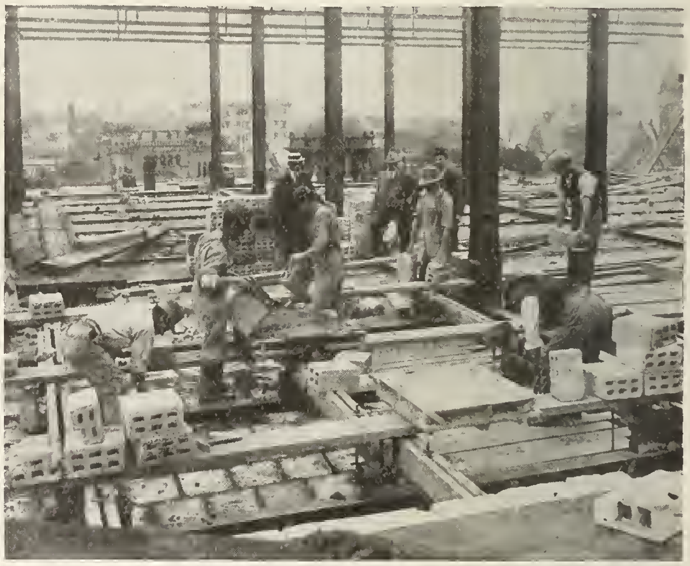
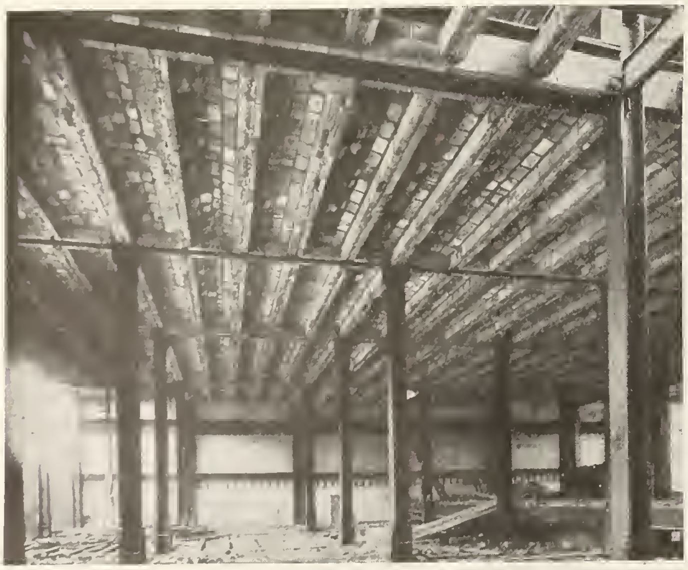
This illustration shows the Bennett System of Segmental Arching in course of construction on the O'Keefe Brewery Company's new building—Toronto.

Architects and Engineers are invited to inspect our work at any time.





This illustration shows the finished floor and ceiling underneath.

We make a specialty of this particular kind of hollow tile work.

Our workmen are experienced and our equipment up-to-date.

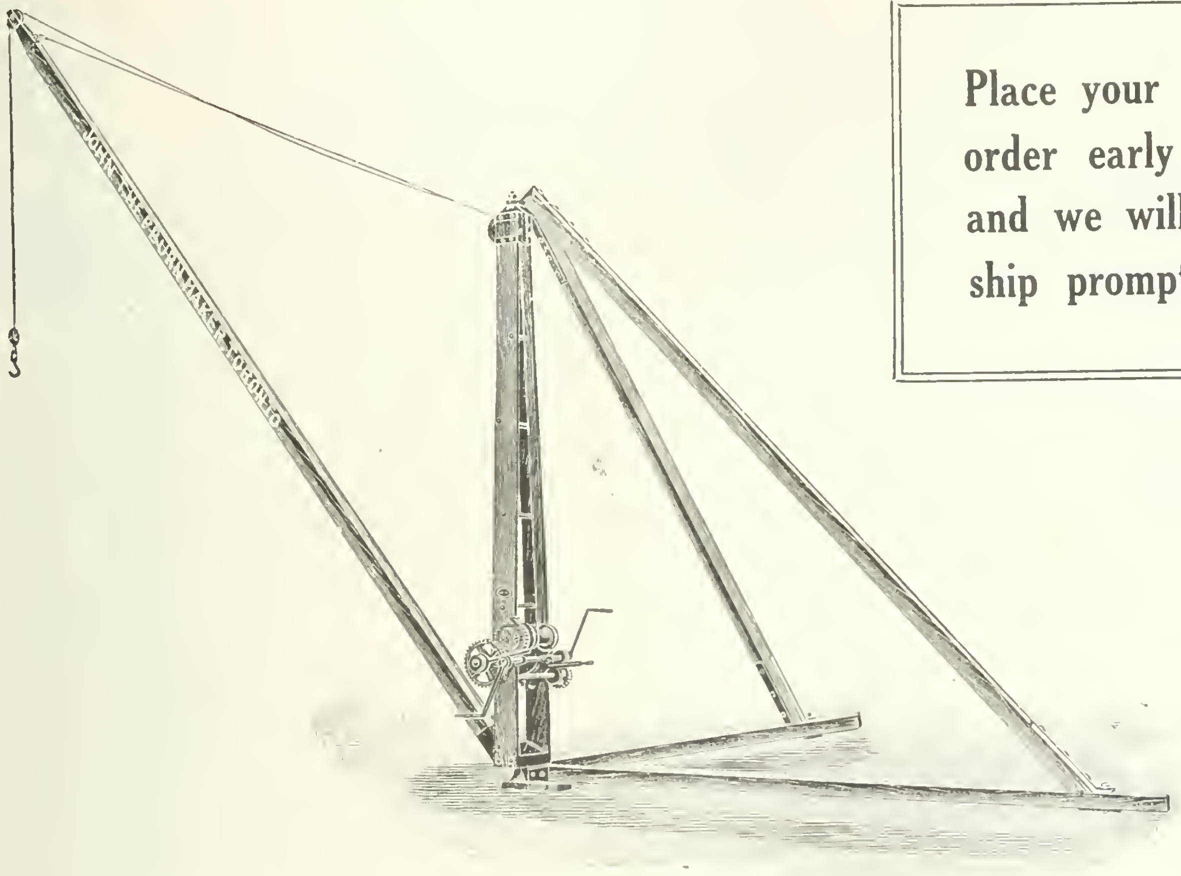
We guarantee first-class workmanship at the lowest cost.

ROBERT BENNETT

Fireproofing Contractor

Builders' Exchange, TORONTO **Phone Main 710**

Residence Phone Beach 4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Place your order early and we will ship promptly.

The Proved Economy of Hepburn Scotch Derricks

If you cut the time upon a job and still do the job right, you are time and money in pocket. When you reduce labor by better methods and better equipment you also save time—and save money. You can get through more work, in less time, and at a better profit. Hepburn Derricks represent bed-rock economy in construction work equipment.

They have weight where weight is needed. They have great strength. Yet every part is so well proportioned, so accurately and staunchly built, that a Hepburn Derrick is more easily operated and will do more work than any other derrick on the market.

Ask any man who has used them.

Made in standard sizes one-half ton upwards. Interchangeable parts kept in stock for prompt shipment. Operated by hand or power. Fitted with single and double-purchase gears, band brake, and high-grade wire heaving rope. Interchangeable parts always in stock.

Iron Founder, Crane Builder and Machinist

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We Make Good Stone

In actual wear *Roman Stone* is far superior to most natural stone and it has the great advantage of being reinforced.

It possesses unusually good fire resisting qualities and is the best building material on the market.

Roman Stone Costs Less
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Send plans for prices

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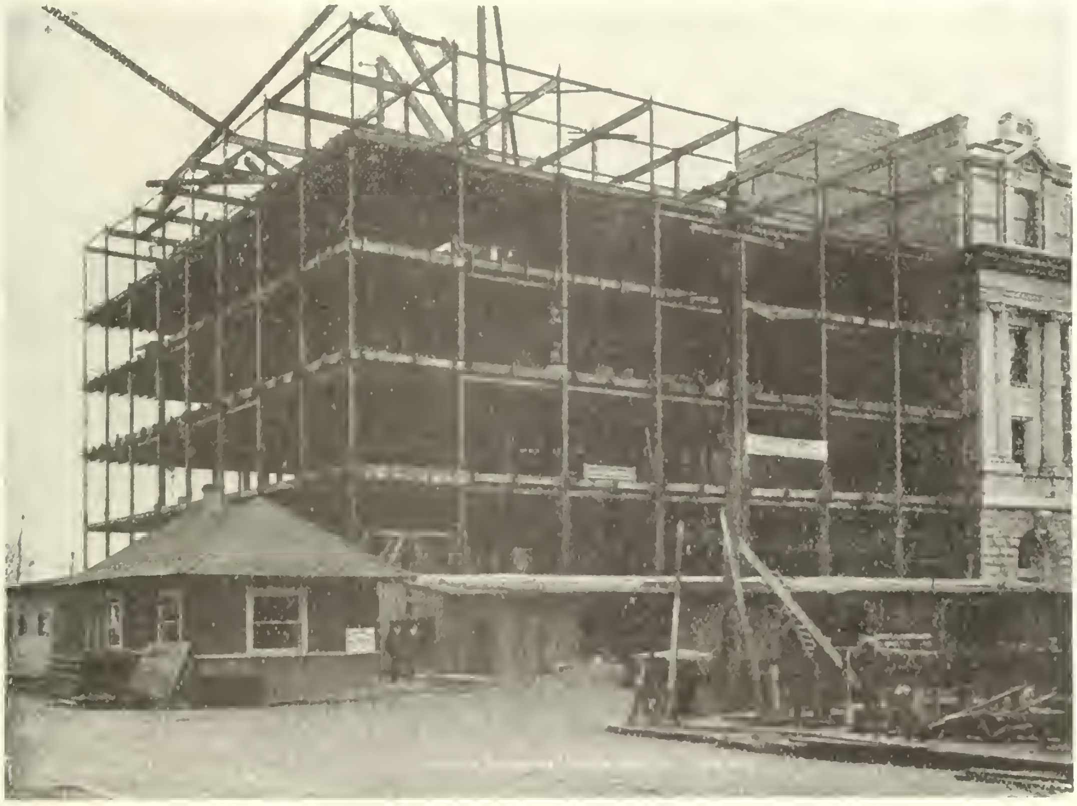
AMERICAN STEEL & WIRE CO.'S
TRIANGLE MESH
CONCRETE REINFORCEMENT



WINCH BUILDING, VANCOUVER, B. C.

United States Steel Products Co. 30 Church Street, New York

Exporters of the Products of American Steel and Wire Company

Canadian Offices:

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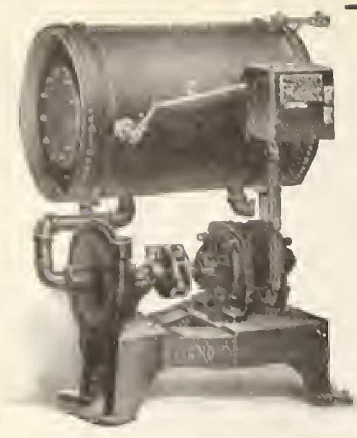
Engineers' Handbook, Slide rule and full details regarding Prices and Stock on hand, address any of above offices



Economy Automatic Condensing Pump and Receiver

An expansion tank, and automatic switch and a centrifugal pump automatically operated by an electric motor.

Stimulates circulation by drawing condensation through system, venting the air and returning the water to the boiler at high temperatures.

Eliminates snapping and **cracking** in the radiators and pipes.

A **stimulant** and **governor** to the entire system.

A great saver of fuel.

Requires no attention other than occasional oiling.

Operates equally well on high or low pressure systems.

An "Economy" centrifugal hot water circulating pump will increase the efficiency of your hot water heating system from 25 to 50%.

Tell us your troubles and we will advise you how to overcome them.

"Economy" Pumps are installed in

Bank of Commerce, MONTREAL, CAN.; King Edward Schools, McArthur Bldg., Great West Life Bldg., Bank of Montreal, WINNIPEG, CAN.; Parliament Bldg., EDMONTON, CAN.; Sherman Theatre, CALGARY, CAN.; King Edward Hotel, Alexandria School, TORONTO, CAN.

THOMAS & SMITH, Inc., 116-118 N. Carpenter St., CHICAGO, ILL.

Represented in Toronto by JAMES J. MORTINDALE, Room 112, Mail and Empire Bldg.

Announcement

Steelcrete TRADE MARK

Steelcrete Expanded Metal

Steelcrete TRADE MARK

We have received exclusive rights for the sale of **"Steelcrete" Expanded Metal Products** in the Province of Quebec, manufactured by **The Consolidated Expanded Metal Companies** of Pittsburgh.

The excellent qualities of **"Steelcrete"** are well known throughout the world as an **Ideal** improvement and are well known throughout Canada, having been used in the largest and best Engineering-Construction Works.

We can sell the **world's best-made Expanded Metal "STEELCRETE"** at a price that will interest you.

We carry in stock at Montreal a large supply of standard sizes and can make immediate delivery.

Write us or call us up for samples, catalogues and prices.

WE SOLICIT YOUR ENQUIRIES

Munderloh & Company, Limited
MONTREAL

Sturtevant Propeller Fans

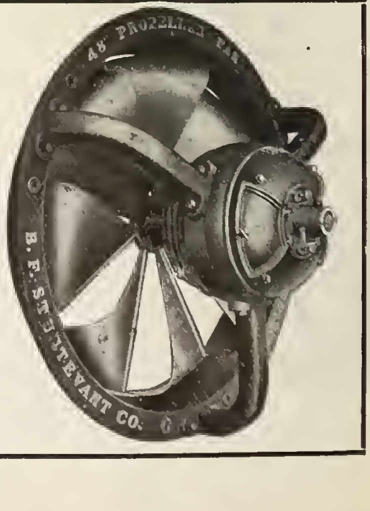
REG. U. S. PAT. OFF.

For VENTILATING and COOLING

The design of our Propeller Fans is along the same scientific lines as all our fan product, and that is why Sturtevant Propeller Fans deliver more air for the same size fan and with less power expenditure than any other propeller type made. The construction is particularly strong and durable.

They will quickly change the air in factories, workrooms, kitchens, billiard halls, etc., carrying away the smoke, fumes, hot air, keeping the atmosphere sweet and cool.

The electric fans are equipped with motors wound for either alternating or direct current. *Ask for Bulletin No.* 146 Z.



B. F. STURTEVANT COMPANY OF CANADA, LIMITED

Office for Eastern Canada:	Office for Central Canada:	Office for Western Canada:
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Crown Gypsum Company, Limited

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CROWN

CANADA

Cement Plasters
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Plaster Paris
Gypsum Tile

Hard Wall Plaster

White Gypsum - A Modern, Up-to-Date Plant - Experience

Combined to Produce a Finely Ground, Evenly Calcined, White Material, in Every Way Unequalled for Plastering and Construction Purposes

BUILDING MATERIAL DEALERS

Write us now for our proposition. It was built for you!

Lythmore - Ontario - Canada

Wooden Water Pipe

Galvanized Wire Wound and Continuous Stave Pipe for Water Works, Power, Irrigation, etc.

Withstands 250 lb. working pressure.

Not affected by Frost, Corrosion, Electricity or Acid. Water Works Systems installed. Prompt attention to inquiries.

Write for prices.

Manufactured by

Canadian Pipe Co., Limited

P.O. BOX 915

Factory: 550 Pacific St., VANCOUVER, B.C.

FLEXIBLE COUPLINGS

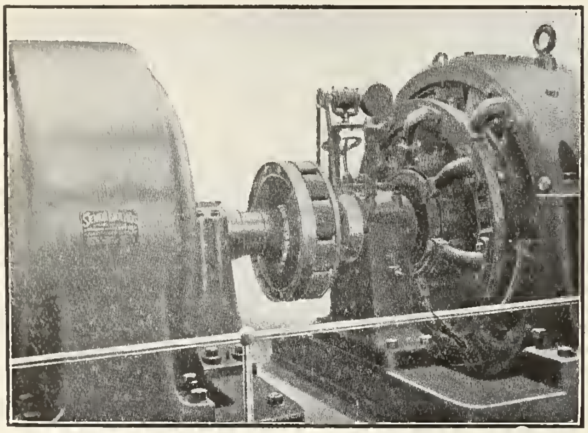
For High and Low Speeds

Save Power

Reduce
Running
Costs

Smooth Drive

Get Particulars from :



Suitable For

Centrifugal Pumps

Electric Motors and Fans

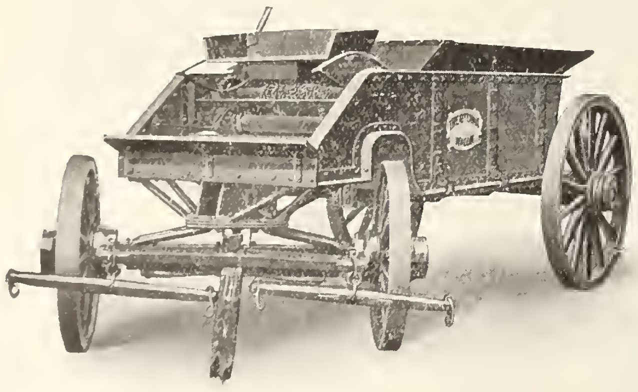
Steam Engines

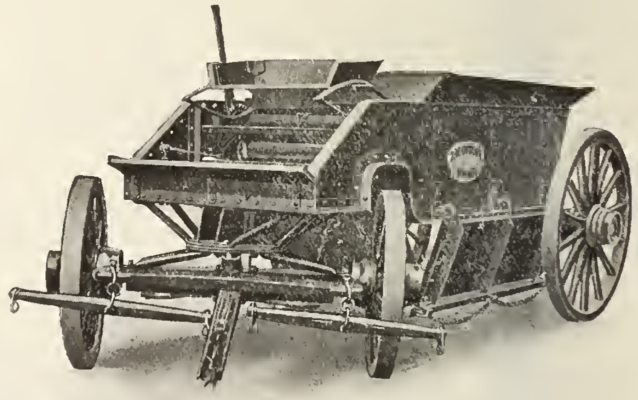
and

General Power Transmission

The Canadian Boving Co., Ltd.

Vancouver Office, 427 Seymour Street.
164 Bay Street, TORONTO





Ottawa Steel Dump Waggons

are the latest development in Dump Waggons, and the original cost is no higher than inferior makes.

Strong, light, everlasting, first cost is last cost.

Let us demonstrate the superiority of this Dump Waggon over all others.

The General Supply Company of Canada, Ltd.

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"Quality is Economy"
in Paving Brick

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tell their good opinions about "Canton" Shale Paving Brick in a Booklet

"What Experts say about Metropolitan Paving Brick"

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Make Permanent Pavements

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The Thew Shovel for Road Construction

The general use of the Thew Shovel in road building and street grading is conclusive proof that it is adapted to the conditions, economical for the purpose and efficient in operation. The following list of some of the contractors, in the State of New York alone, who have used and are using The Thew No. O Full Circle Swing Shovel in this class of excavation will indicate the popularity of the machine and its undisputed merit on such work :

Joseph Walker, New Paltz, N.Y.
H. B. Sproul, Peekskill, N.Y.
S. B. Van Wagnen, Rondout, N.Y.
James E. Martin, Ploughkeepsie, N.Y.
F. G. Fowler Const. Co., Mt. Kisco, N.Y.
Brown & Lowe, Schenectady, N.Y.
Buckley Const. Co., Plattsburg, N.Y.
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Monroe Roads Co., Pittsford, N.Y.
Santanoni Const. Co., Newcomb, N.Y.
J. D. Moynehan Const. Co., Mohawk, N.Y.
Merritt Const. Co., Tuckahoe, N.Y.
Thos. Fitzgerald, Fredonia, N.Y.
Shanley-Morrissey, Inc. New York, N.Y.
M. F. Dollard, Albany, N.Y.
M. A. Aldrich, Ploughkeepsie, N.Y.
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F. C. Humeston, Brooklyn, N.Y.
H. P. Burgard, Buffalo, N.Y.
Eastern Concrete Steel Co., Buffalo, N.Y.
F. C. Lauer & Sons Co., Rochester, N.Y.
W. J. Burns Co., Rochester, N.Y.
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Cunningham-Woodard Co., Hudson Falls, N.Y.
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The Thew Shovel is popular because it can do the work.

There is no other shovel of equal weight and dipper capacity that can handle as difficult material, nor, under equal conditions, as large an output as the No. O Thew.

Investigate the Thew Horizontal Crowding Motion.

Write for Catalog and Information

THE THEW AUTOMATIC SHOVEL CO., Lorain, Ohio

for Highest Efficiency, Absolute Reliability, Greatest Economy

Used by the Largest Mining Companies and Hydro-Electric Plants.
Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.

Sizes 3 to 42" Diameter up to ¾" in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints

Write for our Catalogue No. 4 and prices on your requirements

AMERICAN SPIRAL PIPE WORKS - MAIN OFFICE—CHICAGO
NEW YORK OFFICE 50 Church Street

100 Tons 20 lb. Section.
100 " 30 "
100 " 40 "
100 " 50 "

RAILS

Ready for shipment

4000 Pairs 20 lb. Fishplates.
750 " 60 " Angle Bars.
100 " 80 " "

PROVINCIAL STEEL CO., LIMITED

COBOURG, ONTARIO

MERCHANT BARS ROUNDS and SQUARES 3/8 to 2-in. FLATS 3/4 x 1/8 to 4 x 1 ANGLES 3/4 x 1/8 to 2 1/2 x 1/2

Cold Twisted Squares for Concrete Re-inforcing made from New Steel Billets only.

Toronto Representative: Mr. H. B. Holloway 18 Wellington St. E. Montreal Representative: Gerald Lomer, Limited, 43 St. Sacrement St.

The Steel Company of Canada Limited
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Plain Rounds, & Squares, Cold Twisted Squares
Maxwell Deformed Bar
STEEL BARS
for Reinforcing Concrete

Dominion Steel Castings Company, Limited

Annual Capacity 12,000 Tons

Stock Process for Small Work
Acid Open Hearth for Heavy
Machinery Castings

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ELECTRICAL WIRES AND CABLES

in Copper and Aluminum

Copper Clad (Duplex Metal) Wire Galvanized Steel Strand for Guys

Canada Wire & Cable Co., Limited, 1170 Dundas St. TORONTO

Stock of Wire and Cable carried in
TORONTO, MONTREAL and WINNIPEG

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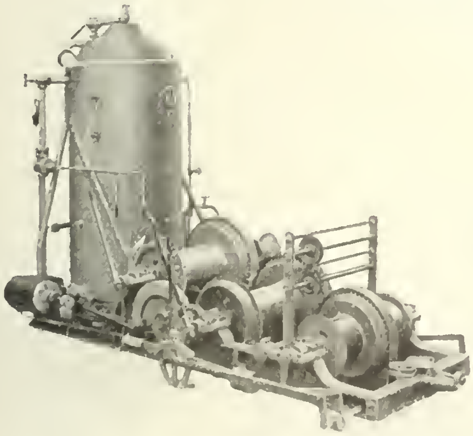
"Beatty Hoists"

Steam and Electric



Have stood the test of time and given satisfaction wherever they have been placed.

Ask the man who has one.

We have shipped Engines into almost every part of the Dominion and will gladly put you in touch with our nearest customer.

Can furnish any size or type and give prompt shipment.

We also build Dredges, Steel Scows, Centrifugal Pumps, Derricks, Derrick Irons, etc., and are sole Canadian makers of the **Williams "Faivrette" Clamshell Buckets.**

M. Beatty & Sons, Limited, **Welland, Canada**

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Dominion Equipment & Supply Co., Winnipeg, Man.
R. Hamilton & Co., Vancouver, B. C.

Canada Steel Co., Limited, Hamilton, Ont.

(Independent of all mergers)

Manufacturers of STEEL

For Reinforcing Concrete.
Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.

ANGLES from ¼ x ¼ in. up to 2 x 2 ins.
ROUNDS and SQUARE from ⅜ in. up to 1¼ ins.

We can ship from stock

FLATS from ¾ in. up to 4 ins. in width, and other special sections.

Ask us for prices—they will interest you.

Office and Works: Sherman Ave., North

THE TEST

The first Creosoted Wood Block Pavement laid in America was on Tremont Street, Boston, Massachusetts, twelve years ago.

This pavement was laid to secure a test of the wearing qualities of Wood Block.

The street was paved, partly with Asphalt of standard construction and partly with Creosoted Wood Block.

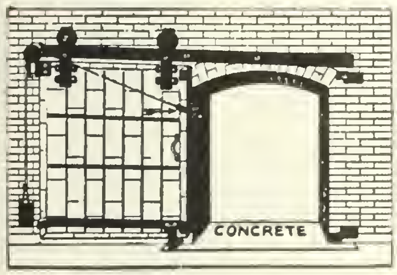
The Asphalt was taken up some time ago and street newly paved.

The guarantee has long since expired on the Creosoted Wood Block but the pavement is as good as ever, the surface wear is scarcely apparent, and it will be many years before repairs are necessary.

We have the very best materials and we endeavor to manufacture DOMINION WOOD BLOCKS up to the highest possible standard.

The Dominion Creosoting Co., Ltd.
Vancouver, B. C.

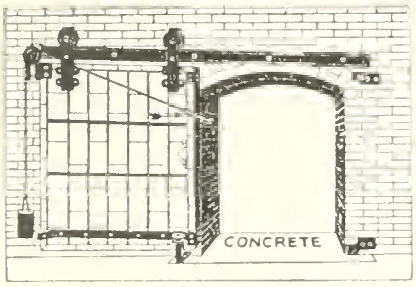
FIRE PROTECTION



People are beginning to realize the necessity of conservation from loss by ***fire.***

It is an actual fact that the people pay all fire losses out of their own pockets through the higher rates. They pay for fire Insurance protection and the Fire Insurance Companies are just the distributing centres for the money.

A reduction in ***Fire Waste*** means a reduction in this tax for fire insurance protection. This is a business proposition.



Our Products are adapted for use in the better class of office buildings, stores, factories and hotels, and are made in accordance with the rules and requirements of the Board of Fire Underwriters governing the construction.

We invite Architects and Engineers to send plans and specifications for prices.

Manufactured by

A. B. ORMSBY, LIMITED

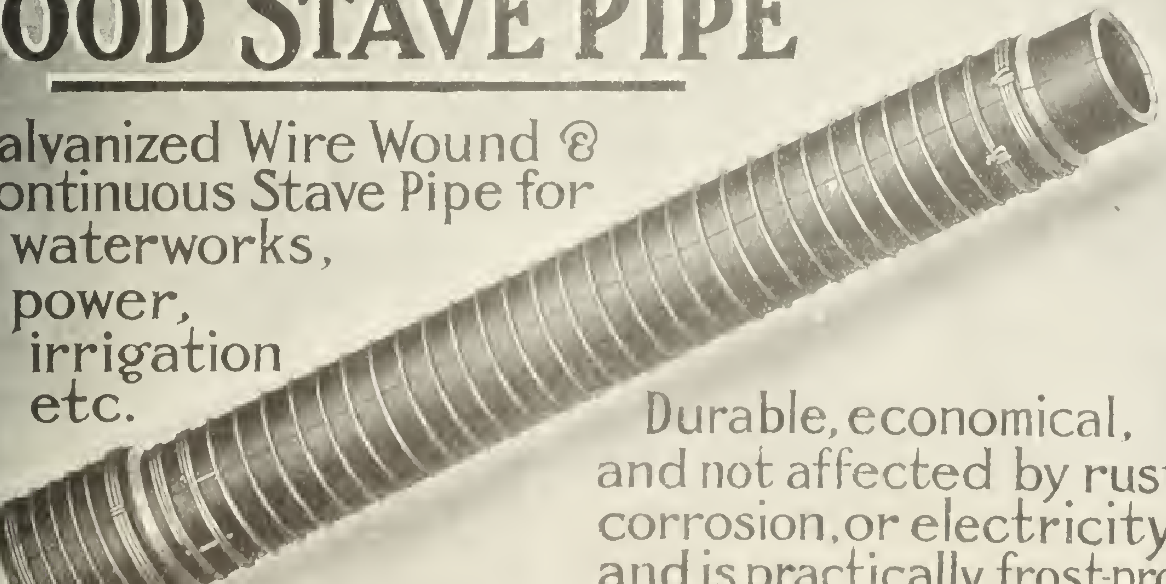
Factories TORONTO and WINNIPEG

REPRESENTATIVES: General Contractors' Supply Co., Halifax, Stinson Reeb Builders Supply Co., Montreal, Canadian Agency & Supply Co., Ottawa, C. H. Abbott Agency and Supply Co., Regina, Robt. S. Selanders, Saskatoon, C. H. Webster, Calgary, Walker & Barnes, Edmonton, Evans, Coleman and Evans, Vancouver and Victoria.

WE MANUFACTURE THE ORMSBY-LUPTON STEEL SASH

WOOD STAVE PIPE

Galvanized Wire Wound & Continuous Stave Pipe for waterworks, power, irrigation etc.



Durable, economical, and not affected by rust, corrosion, or electricity, and is practically frost-proof.

Prompt attention to all enquiries. Write for Catalogue.

The Dominion Wood Pipe Company, Limited

New Westminster, B.C.

Wells & Gray, Limited

Engineers and Contractors

TORONTO

List of 1912 Work

Swift Canadian Cold Storage Warehouse, West Toronto
This Nine Storey Reinforced Concrete Building was Completed in Record Time

Swift Canadian Fertilizer Building, West Toronto
Two Storey Reinforced Concrete Building, 114′ x 98′, just being started

Swift Canadian Market Building, Toronto

Fairbanks, Morse Tractor Building, Toronto
This building is progressing rapidly, T. Pringle & Son, Engineers in charge

Union Stock Yards Sheep Pens, West Toronto
This large one storey building (380′ x 112′) was completed in 6 weeks

Ford Motor Company Factory Extension, Walkerville, Ont.
This extension is of Reinforced Concrete, 4 storeys, 75′ x 507′

Ford Motor Company Engine House, Walkerville, Ont.

Ford Motor Company Gas Producer Building, Walkerville, Ont.

Ford Motor Company Heat Treatment Building, Walkerville, Ont.

Dominion Stamping Company, Limited, Factory, Walkerville, Ont.
This building is of Reinforced Concrete, 5 storey, 150′ x 56′

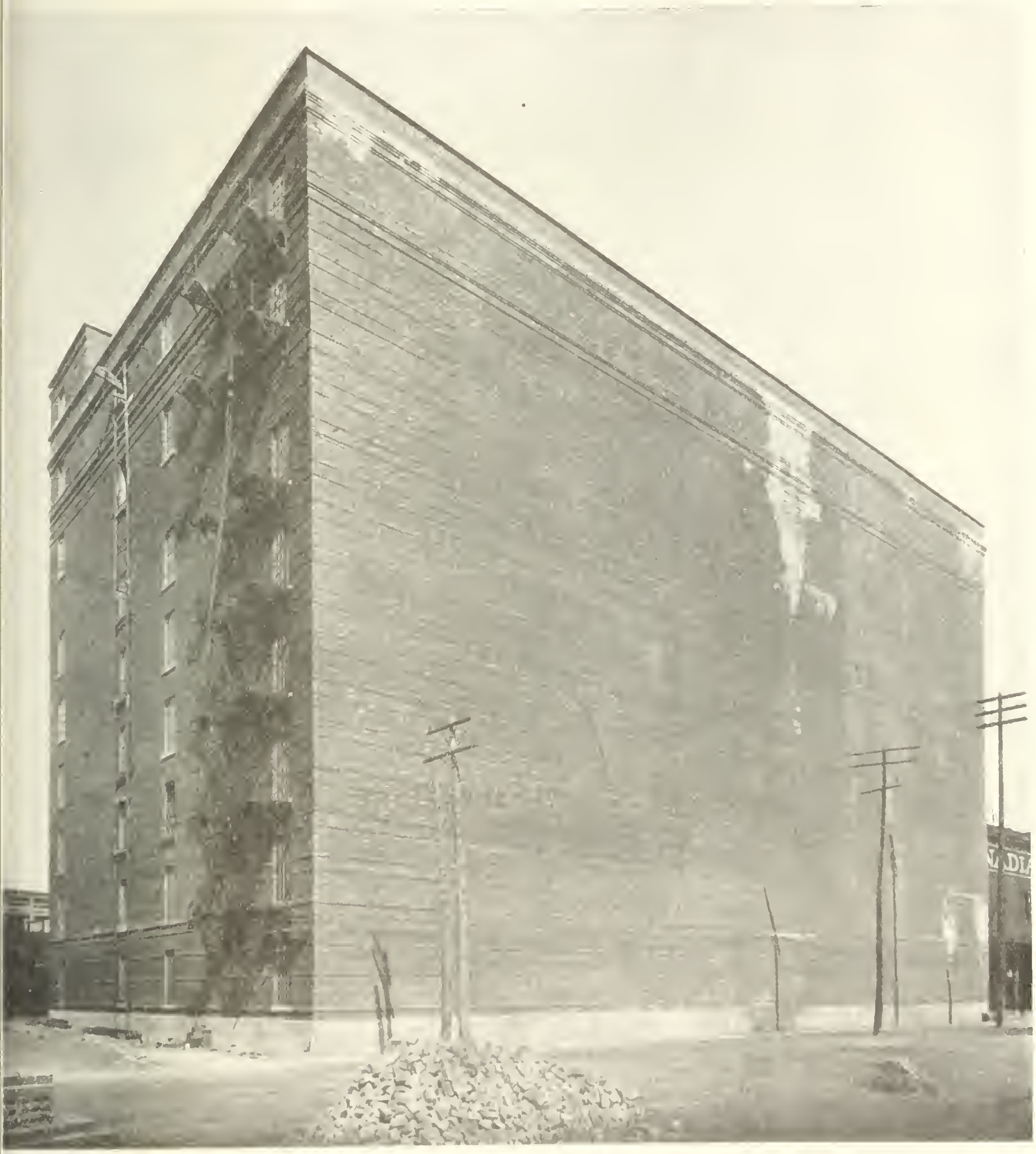
Dominion Stamping Company, Ltd., Power House, Walkerville, Ont.
This large fire proof Engine & Boiler house is now complete

Walker Sons Extension of Power Building, Walkerville, Ont.
This building is of Reinforced Concrete throughout. 3 storey, 112′ x 88′

Universal Car Agency Garage, Windsor, Ont.
This is a two storey building, 100 x 100

It will be noticed that where we do one job we do many. There must be a reason.

Wells & Gray, Limited



COLD STORAGE WAREHOUSE

Recently completed for Swift Canadian Company, West Toronto

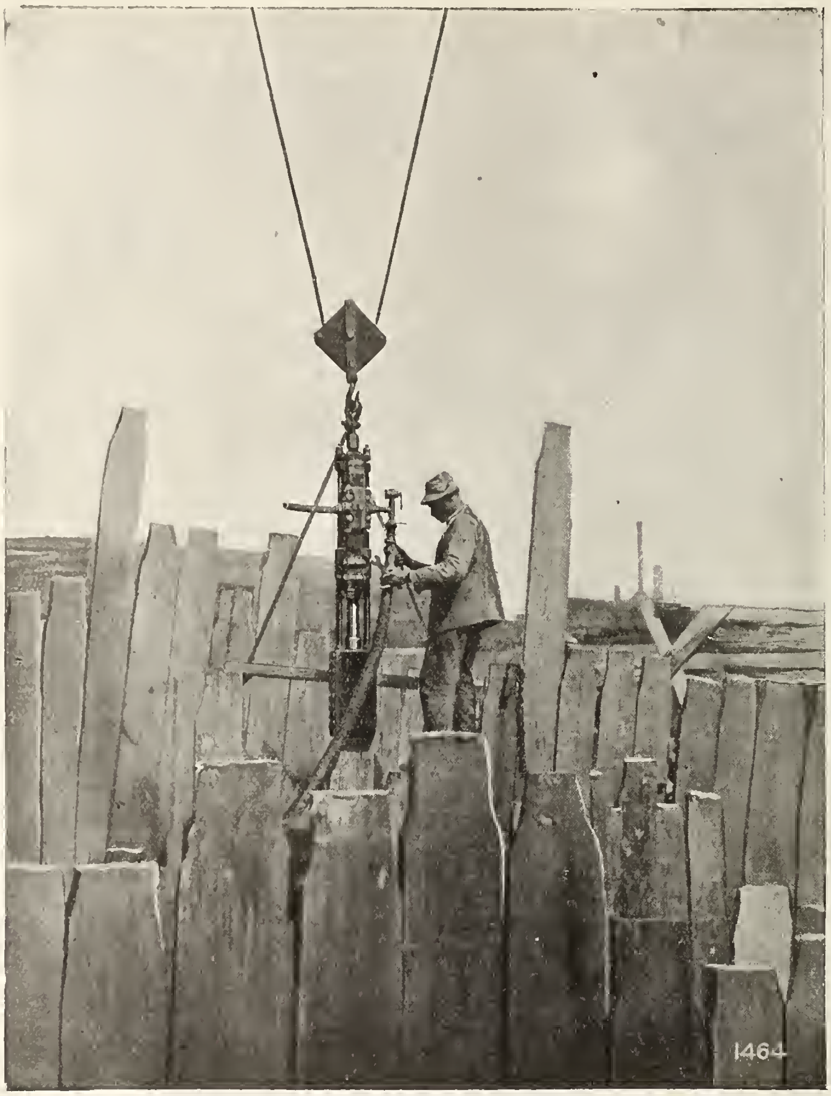
Wells & Gray, Limited

247 Confederation Life Building, Toronto

Weight is
chiefly in
foot piece
which takes
up all the
vibration

Machine is
run by either
steam or
compressed
air

Drives piles
with a
rapid
succession
of blows
which
amount to
a steady
push rather
than a
drive



INGERSOLL-RAND SHEET PILE DRIVER IN OPERATION

The uses of the INGERSOLL-RAND Sheet Pile Driver are many and various.

They are employed practically and economically on contract work, sewage and trench work, building wharves, breakwaters and coffer dams; in fact they can be used nearly everywhere it is necessary to temporarily keep back water, earth or sand.

This type of Sheet Pile Driver is suitable for driving piles 12 inches by 3 or 4 inches in section up to 25 feet in length.

A spoiled pile is a rare occurence with an INGERSOLL-RAND Sheet Pile Driver.

Our catalog K-139 gives a good description of this machine.

CANADIAN INGERSOLL-RAND COMPANY
LIMITED

COMMERCIAL UNION BLDG. - MONTREAL, CAN.

MONTREAL COBALT WINNIPEG ROSSLAND
SYDNEY TORONTO SOUTH PORCUPINE LETHBRIDGE VANCOUVER

A Belt Which Conveys ALL the Power

Practical men know the drainage of power from a slipping belt, ***and because they know,*** they are buying

GOODYEAR RUBBER BELTING

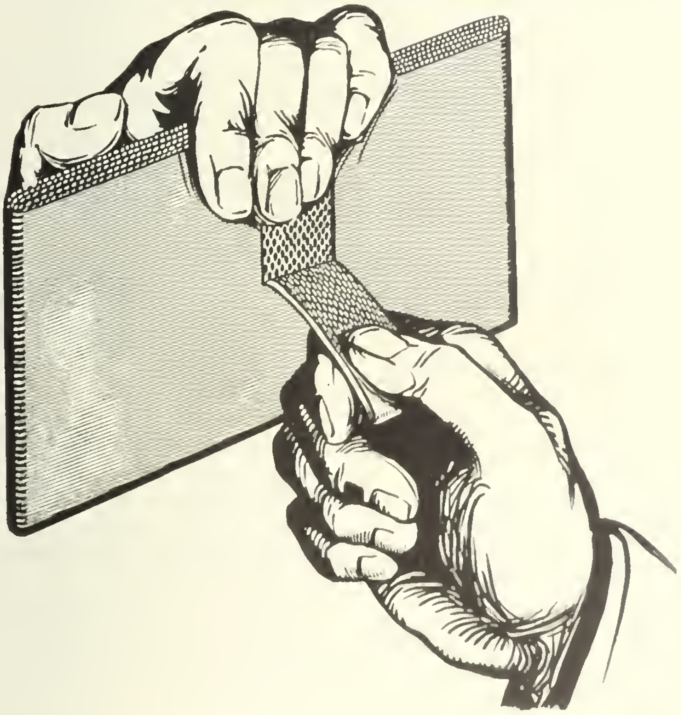
Which Neither Slips Nor Stretches

It is built up, layer upon layer, of close-woven, long-fibre, cotton fabric, rubberized and cured under Goodyear processes. And every Goodyear belt has in it the lowest possible minimum of stretch, because the belt is "cured" whilst stretched to the limit of safety in a special machine.

That is the Goodyear Method of Belt Manufacture

And the result is entirely satisfactory to belt users—a fact to which our enormously increased sales testify. What is the significance of this CONTINUED SALES INCREASE—30% over last year? Simply that Goodyear Belting more than fulfills the claims made for it by the Goodyear people—who know what a belt should do, and make a belt to do it.

It has cost us less than $200.00 for claims or adjustment of every kind in connection with our total output for the past two years—a remarkable tribute to Goodyear reliability.



Look into the Belt for Yourself—Try to Tear it Apart.

Make a cut in the top layer—and then try to pull it apart. You will get a faint idea of its strength.

That is the result of forcing rubber at a tremendous pressure through the fine cotton fabric—separating every strand—thus abolishing all internal friction or grinding. Whilst these layers of fabric are afterwards so compressed as to be almost homogeneous, the finished belt bends easily, the "duck" being so woven as to retain complete pliability in the finished belt.

For Main Drives and High Speed Pulleys GOODYEAR Belting is the Best

It has all the tensile strength necessary to absorb tremendous strain without slip, stretch or rent. The grip of rubber and the prodigious strength of hard-twist cotton fabric are united, and prove equal to every emergency.

Where the power transmitted is high, and great tensile strength is essential, Goodyear Rubber Belting proves its worth.

EVERY GOODYEAR BELT IS SUBJECTED TO A STRINGENT TEST BEFORE LEAVING THE FACTORY, and what is more, the materials used in the manufacture are also tested in the Goodyear laboratory before using.

IF YOU USE A BELT AT ALL IT WILL PAY YOU TO USE A GOODYEAR

Loss of power is loss of profit and an inferior belt is dropping power all the time. Goodyear belting quickly earns it cost in power saved and trouble avoided.

TWO HUNDRED AND FORTY ROLLS A TOTAL OF 72,000 FEET

We have just received an order for this quantity of GOODYEAR RUBBER BELTING from one business concern in the west, for the equipment of interior elevators. Such an order shows supreme confidence in the quality of GOODYEAR Belting.

If we have not just the belt you require we will make it for you.

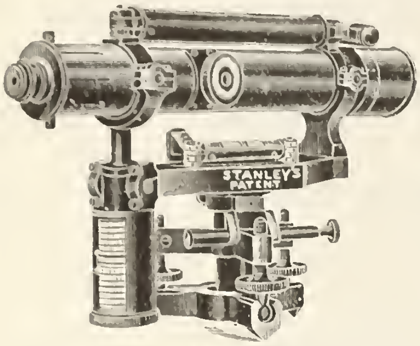
In the choosing of belts our booklet would be of great assistance to you. We supply it free. Write to our nearest branch for one.

The Goodyear Tire and Rubber Company of Canada, Limited

Factory, Bowmanville, Canada

BRANCHES: Victoria, B.C. Vancouver, B.C. Calgary, Alta. Regina, Sask. Winnipeg, Man. London, Ont.
Hamilton, Ont. Toronto, Ont. Montreal, Que. St. John, N.B.

TRADE **STANLEY** MARK



Stanley's Gradiometer saves much time in Railway and Drainage Works. Can be divided to read either ordinary or percentage gradients. Illustrated phamphlet on application.

The Largest Manufacturers of Surveying and Drawing Instruments in the World.

Drawing Office Stationery of all kinds supplied on the most favorable terms. A very large stock kept.

Please send for our catalogue "K 91" and compare our prices with those of other *first-class* makers.

We were awarded four Grand Prix and a Gold Medal at the Turin Exhibition, 1911.

W. F. Stanley & Co., Limited
Great Turnstile, Holborn, LONDON, ENGLAND

DIGGING POWER

is vitally essential in all grab buckets. Therefore, the principle on which the bucket is operated should be investigated by every prospective buyer.

"OWEN"

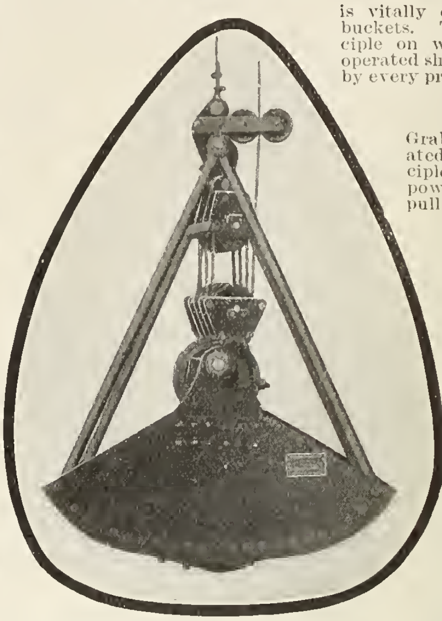
Grab Buckets are operated on the purchase principle, exerting a digging power SEVEN times the pull required to close the bucket. This means a Full Load at every grab. With buckets operated on the power wheel or lever principal, the tendency to lift the bucket off the material increases as the jaws close, and consequently decreases the digging power of the bucket when it needs it most. The lifting tendency of the 'Owen' Bucket is reduced to the minimum and remains so as the bucket closes.

Cables are reeved over large sheaves, have fair leads, and do not come in contact with the material being handled.

Will do more work per capacity in hard materials than any other bucket.

Write for full details and illustrated matter.

The Owen Bucket Company
529-531 Rockefeller Building
Cleveland, Ohio



Brantford Roofing

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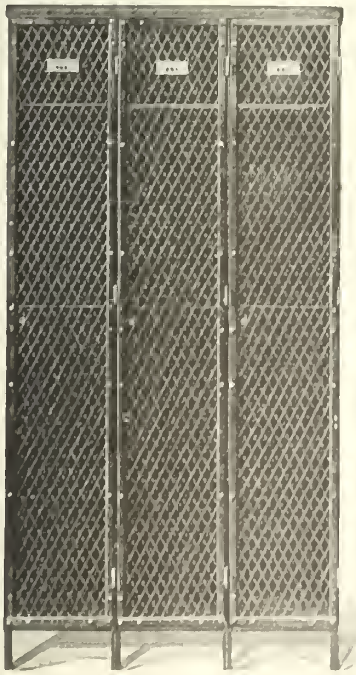

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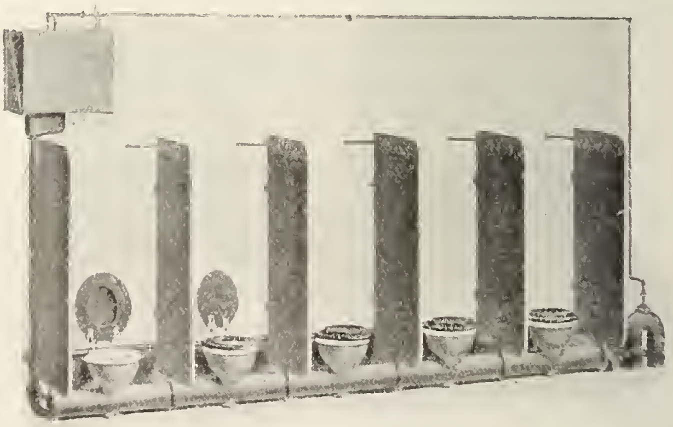

Plate F. 517

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Vol. 26 October 23, 1912 No. 43

Westmount Contributes a "Scandal"

IN the old days, when Montreal was ruled by a coterie of aldermen whose actions were, to put it mildly, not above suspicion, the neighboring city of Westmount was regarded as an example of model administration—as a city where clean methods were in vogue and where officials got fair play. But now Westmount has its "scandal," to use a much abused term, and two or three aldermen seeking notoriety have been making much ado about nothing. As in Toronto, Ottawa and Calgary, the city engineer's department is the storm centre, Mr. Archibald Currie, the head of the department, having been the object of much mud-slinging on the part of certain disgruntled aldermen. The elections are not very far off, and we all know the amount of zeal aldermen can exhibit when they are about to face their constituents. In municipal, as in provincial, politics, the most tricky methods are often adopted either to magnify the services of the member seeking re-election or to put the blame on to the shoulders of other people. The easiest course in the event of anything going wrong, is to go for officials, and to put the responsibility on to them—for are they not paid to be shot at by men who do not know the elements of civic engineering? Personal prejudices too often play a large part in the conduct of some aldermen, who, when they find officials with a little backbone, make their lives as uncomfortable as they possibly can. These personal cross-currents, as we have shown in several instances, are detrimental to the interests of the cities, in that they destroy all ideas of co-operation and harmony, which ought to form the basis of civic work.

In Westmount the bother has arisen over estimates and expenditure, particularly in relation to a fire-station built by the city. Our readers need not be reminded that estimates are not even at the best in the nature of an exact science, and that with rising markets and dear labor, calculations are apt to be upset. But civic critics who are determined to have a go at officials ignore these considerations and expect from city engineers and surveyors a sort of prophetic vision enabling them to anticipate with exactitude the advances in materials and labor. The expenditure on the fire station has admittedly very largely exceeded the original estimate, and as an independent committee is now inquiring into this subject, we need not go minutely into the why and wherefore of the use in the outlay except to say that, according to Mr. Currie, the Fire Committee had monthly reports as to the progress of the work and its cost, and that nothing was done in the way of adding to the original plans without their sanction.

Mr. Currie has not taken the attacks upon him lying down: he has warned his chief detractor that he resents the language used concerning the estimates, and that unless there is a cessation of these attacks, action may follow. If members of Councils are dealt with in this way we shall hear less wild criticism of officials. An example of the unfair methods adopted to discredit Mr. Currie may be cited. The alderman who has been the chief baiter of the city engineer published a list of estimates and expenditures showing that the former had been greatly exceeded; but in order to make a strong case against Mr. Currie the instances where the expenditures had been below the estimates were deliberately suppressed. Moreover, in the published estimates, expenditures were included for work for which Mr. Currie was not responsible. It is to the credit of the council that this mode of controversy met with condemnation on the part of several members. When the whole figures of estimates and expenditure are considered a very different complexion is put on the matter. Instead of a big over-expenditure, it is found that, taking two years (only part of which Mr. Currie is responsible for), there is a net deficit of $3,889.32 on a total expenditure of $193,543, or a little over two per cent., certainly not a big amount on which to base a campaign against an experienced civic engineer. The Mayor, who is connected with the building trade, very properly commented on the rise in materials during the last two years, and in view of this, most people will be of opinion that the department has done exceedingly well in keeping the expenditure so close to the estimates. The whole affair seems to be an attempt to earn cheap popularity at the expense of the city engineer.

The case of Mr. Currie is another instance where the Canadian Society of Civil Engineers might very properly take action to protect its members. The Society is doing excellent work from the educational standpoint, but surely it is just as important to insist that its members get fair play at the hands of municipal bodies. If it be recognized that the Society is prepared to take action in cases similar to these on which we have commented, it is pretty certain that municipal engineers will be less subject to these periodical attacks on their reputation and capability.

Sliding metal-faced forms were employed in placing the concrete in the cylindrical tanks of a large reinforced concrete grain elevator, recently built for the Erie Railroad, in Chicago, Ill. This elevator has a storage capacity of 350,000 bushels and is made up of twenty-one cylindrical bins, each 73 ft. high, with inside diameter of 17 ft. 9 in. These bins are surmounted by a reinforced concrete cupola 12 ft. high and 38 x 130 ft. in area. The elevator is supported on 1000 30-ft. piles driven at a level 20 ft. below the surface, the foundation walls and slabs being carried to that depth.

Where Criticism is Discreditable

WE never yet heard of a competition in this country that was closed without some unpleasant incident. We thought that the Provincial Parliament Building at Manitoba would prove an exception, but we thought too quickly. From Winnipeg now comes the allegation that the successful competitor, Mr. F. W. Simon, F.R.I.B.A., was allowed five or six weeks longer in which to complete his drawings than the other competitors. We do not believe that any firm would be unprofessional enough to inspire the further disparaging statement that Mr. Simon's plans are identical with those of the architect awarded second place in the competition, but from whatever source the statement emanates it is a most unfortunate and untimely one to appear in the public press. It is a reflection upon one of the most eminent members of the profession in Great Britain, Mr. Leonard Stokes, F.R.I.B.A., the last year's president of the Royal Institute of British Architects, who was appointed assessor under the sanction of H.R.H. the Duke of Connaught. We have a clipping from one of the leading Canadian dailies in which there is an article bearing a prominent caption, "Plans Were Not Placed in Order of Their Merits." This is not the work of a newspaper man and we repeat that it is undignified and unprofessional. If there had been any cause for complaint the proper procedure would surely have been to have referred the matter to the Royal Architectural Institute of Canada and abided by its good offices. Gratuitous and anonymous criticism is discreditable.

THE freezing of concrete is a subject that would be in danger of becoming hackneyed were it not that each winter brings justification for its repetition in the form of damaged work or of failed structures, says the Engineering Record. The use of concrete in freezing weather is now so common and with proper precautions is attended with such excellent results that there is a temptation to neglect the safeguards. For this reason the action of several cement companies and of dealers in concrete equipment in using their advertising space and sending out instructions to emphasize the necessary precautions should be highly commended. But instead of only a few conducting this educational work, all the cement manufacturers and dealers and the concrete equipment houses should use their efforts to spread the knowledge of the dangers and of the nature of the safeguards. In building work the municipal inspectors should be able to prevent improper practice. Unfortunately the people easiest to reach, that is, the large construction companies and public and private owners having adequate engineering and inspection forces, are not likely to be the serious offenders. The small contractor and the small user is generally less awake to the dangers, and special efforts should therefore be made by suitable placards and bulletins to educate the small dealer in cement and his customers.

The Engineer as a Public Speaker

THE secret of Marc Antony's success, if we are to take him at his own estimate, was his ability to "speak right on." The potency of this ability is no less now than in the day of Antony. Certainly it is bound up more closely with dollars and cents, but one might say that on this account it were the more vital. In the field of municipal engineering, the ability to get up on one's feet and to speak fearlessly, coherently, concisely and conclusively is of inestimable value. But how many engineers are there in Canada to-day who can do it? There are many members of the profession who excel in writing, but few who can hold their own in public speaking and debating, and the question is whether the one is not fully as important as the other.

One is instinctively attracted to a good speaker. There is a magnetism about a man who can hold forth upon a subject and compel attention. Conversely, one is repelled by the man of feeble utterance, who stands up hesitatingly and stammeringly reiterates the same thing.

We believe that the rising generation of engineers in Canada will be well advised to train themselves if not as orators, as public speakers. We heard recently of the evidence of this shortcoming in one of the universities. A series of lectures was being given and at the close of a most important paper, discussion was invited, but with the exception of one solitary question none was forthcoming. Afterwards there were not lacking abundant proofs that there had been many questions in the minds of this engineering audience. The trouble was the almost universal lack of self-confidence.

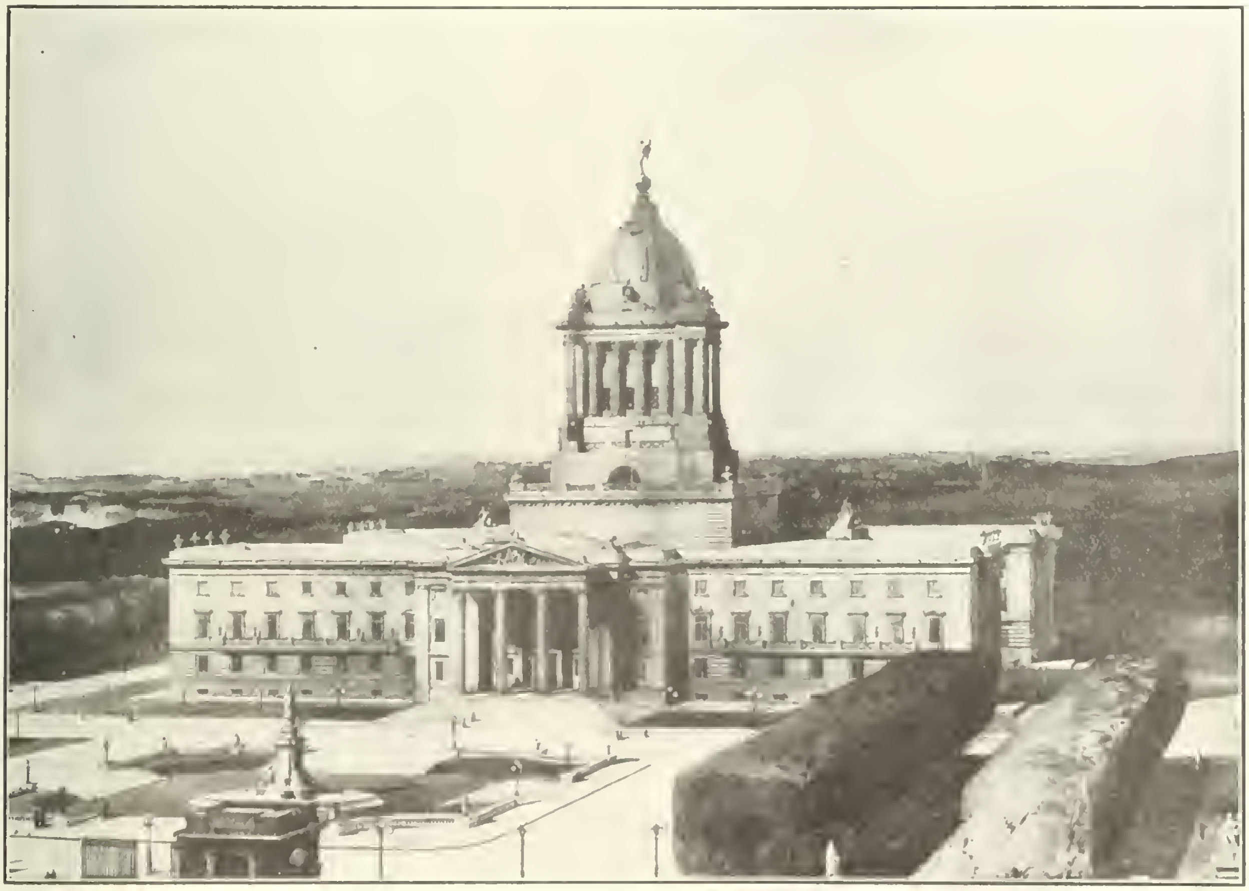
We are inclined strongly to the opinion that the engineer would meet with a higher recognition from the public if he were a better public speaker. As it is, he is overlooked. Positions of influence which rightly belong to him go to non-technical men. Canada is not without recent examples of such appointments. If there be any truth in the aphorism that the pen is mightier than the sword, it might be ventured that the ability to "speak right on" is mightier still. The great issues of the day are decided from the public platform—not by correspondence. The art of writing, valuable though it may be, is a dead letter compared with the ability to speak. For why? Because we know that very often the writings of men, excellent in their way, are the result of prolonged concentration, and that they have been written and re-written perhaps a score of times. But the public speaker must have the rare genius or the cultivated ability of ready concentration combined with complete control of his mental forces and a good vocabulary. It is the rarity of this combination that impresses those who possess, perhaps, none of these traits.

Too often the attempts made by engineers at public speaking reflect more discredit than credit upon themselves and their profession. The training of the engineer is surely defective in this particular. Many of the lecturers are poor speakers and there is no encouragement of oral discussion.

The point is one deserving of some consideration, for engineers are qualified to become leaders of men in all but their ability to speak publicly. There is a world-wide demand for leaders—capable men, trained men, ready thinkers and ready speakers.

Manitoba's Proposed Provincial Parliament Buildings

THE new Provincial Parliament Buildings for Manitoba, which it is proposed to erect in Winnipeg, will be built according to plans submitted in competition with all British architects by Mr. F. W. Simon, of Liverpool, Eng. The bird's eye view of the structure shown herewith is reproduced from a drawing of Mr. Simon's. Several references to the project have already been made in this journal, the announcement of the selection of Mr. Simon's plans having appeared in our issue of October 2. The estimated cost of the buildings is $2,000,000 and it is proposed to make a commencement on the excavation work this fall. A prize of $10,000 went to Mr. Simon as the winner of the competition. The remaining four placed competitors received $2,000 each. In addition to the first prize Mr. Simon will obtain commissions for the supervision of the work approximating $100,000.



The successful design, submitted by Mr. Frank Worthington Simon, of Liverpool, England, for the Manitoba Parliament Buildings. The estimated cost is $2,000,000

"The Roads of Manitoba" was the subject of an interesting paper presented at the Winnipeg convention of the Canadian Highway Association by Mr. P. P. McGillivray, Commissioner of Roads for Manitoba. The writer outlined the progress made by the western province during the last quarter of a century and discussed the relation of the municipality to this field. He referred to the work accomplished through the Municipal Act, by which municipal bodies are empowered to levy taxes for road work. Another act to which reference was made in this connection was the Highway Improvement Act. In speaking of the maintenance problem, Mr. McGillivray alluded to the practice of some of the municipalities in obtaining labor from the farmers in the rural districts.

At the first meeting of the winter session of the Canadian Society of Civil Engineers, Montreal, a paper by Mr. F. H. Peters on the current meter rating station at the irrigation office, Department of the Interior, Alberta, was read by Mr. R. S. Lea. The paper dealt with the work of stream measurements and described the equipment at the current meter rating station. The main feature of the station is a car to which the current meter is attached and carried through the water in a tank, 250 ft. long and 6 ft. wide by 5 ft. 6 in. deep, at different uniform rates of speed. The three elements, the distance, the time, and the number of revolutions of the meter, are mechanically measured, and from these, the velocity of travel of the current meter through the water is related to the revolution per second of the meter, which relation of revolutions to velocity constitutes the rating of the meter. In making the run with the meter the count of the revolutions of the meter and of the time intervals are both automatically registered in the car house by electric apparatus. A brief discussion followed the reading of the paper, Messrs. Francis, McLeod, and Bruner being the speakers.

The Dominion Government is negotiating with the city of Toronto to purchase two blocks of property on Front street. It is expected that, if a satisfactory agreement can be reached, a Customs examining warehouse will be erected.

Noteworthy Road Congress at Winnipeg

Gratifying Progress of the Canadian Highway Association as Revealed at the Second Annual Convention at Winnipeg

THE second-annual convention of the Canadian Highway Association was held in Winnipeg, October 9-12. Among the delegates present at the opening session were His Worship Mayor Waugh; Mr. W. J. Kerr, New Westminster; Mr. James MeGeorge, Edmonton Board of Trade; Mr. J. A. Gould, Edmonton city council; Mr. H. M. Belcher, president of the Winnipeg Automobile Club; Mr. James Weidman, Keewatin, Ont., Board of Trade; Mr. J. B. Barbour, municipality of Lockwood; Messrs. A. E. Wilson, George Thomson, and A. D. Davidson, members of the Indian Head Rural Municipalities Association; Mr. I. E. Argue, member of the Swift Current Board of Trade; Mr. T. C. Pickwell, Toronto Motor Magazine; Mr. Frank E. Mutton, Toronto Automobile Motor League; Alderman Robert M. Yeomans, Toronto city council; Mr. George M. Reeve, Red Deer, Alta.; Mr. J. A. M. Lane, St. Boniface city council; Messrs. Robert McBeth and S. R. Henderson, Kildonan, members of the Manitoba Good Roads Convention; Mr. W. F. Tailman, Winnipeg; and Mr. C. F. Roland, secretary of the Winnipeg Industrial Bureau.

The delegates were officially welcomed by His Worship Mayor Waugh, who dwelt upon the importance of good roads to the country. The mayor congratulated the provincial government on the grant for road improvement work made last session. He referred to the stupendous nature of the task that confronted the Association stating that the difficulty lay in linking the east and the west, and in covering the territory between Winnipeg and Toronto.

Mr. W. J. Kerr, New Westminister, re-elected President of the Canadian Highway Association

The president of the association, Mr. W. J. Kerr, of New Westminster, in his opening address, said that the country had been greatly handicapped by the lack of good roads. The idea of the association was to have a transcontinental road from Halifax to Vancouver. They had often been told that their ideal was but a dream, but they had it brought home to reality within the last few weeks by the performance of T. W. Wilby, who had crossed the continent within 45 days in an automobile. They might learn from the strip of road down the Pacific coast, from Vancouver to San Francisco, 1,200 miles in length, what might be done by perseverance. Mr. Kerr showed that Canada was awakening. In the province of Quebec $10,000,000 had been recently devoted for better roads. The other provinces were following suit and great works were being undertaken in the way of the start of the transcontinental highway at various parts. The widest gap was from Toronto to Manitoba.

His Worship Mayor Waugh, who played a prominent part in the proceedings of the convention

The president then showed the ease with which the work might be done in the prairie provinces and the difficulties which might be encountered in the mountains, but which had been largely overcome by the endeavors of the British Columbia government.

The question of a road was no longer what men wanted but what they must have. The roadway was as important for commercial purposes as was the railway and was becoming daily more and more needed. In every walk of life the good road was needed. The high cost of living would remain so long as there were ruts and not roads.

Origin of Association

President Kerr gave some account of the origin of the association. Its organization took place last fall in New Westminster. At that time the relationship of the association with the other provinces was not fully worked out and all that could be arranged was the appointment of vice-presidents, one from each province. The association had found excellent support from the provincial government of British Columbia, and a grant of $5,000,000 had been made for roads in the province. Already a good highway was prepared from Victoria to Nanaimo, and from Westminster to Hope. Next summer it would be completed as far as Kamloops. This main way was constructed entirely by the government, and the municipalities were left free for the construction of other roads. It was hoped that other governments would follow in the wake of the far westerners and some hope was to be gathered from the fact that Ontario had asked from the Dominion Government the sum of $50,000,000.

This might be a large demand, but the intention of the association was to get a large deputation of members to go to Ottawa and there lay their plea before the government and get the support which it merited.

The minutes were presented by the Secretary, Mr. P. W. Luce, of New Westminster. These provoked some comment as to the concentration of the work in British Columbia.

The election of officers held on October 10 resulted as follows:—President, Mr. W. J. Kerr, New Westminster; vice-president, Mr. S. E. Mutton, Toronto; secretary, Mr. P. W. Luce, New Westminster; treasurer, Mr. T. E. Baxter; vice-presidents—one from each province—British Columbia, Mr. A. E. Todd, Victoria; Yukon, Mr. George Black; Alberta, Mr. James M. George, Edmonton; Saskatchewan, Mr. George Thompson, Indian Head; Manitoba, Mayor Fleming, Brandon; Ontario, Mr. W. J. Trethewey, Toronto; Quebec, Mr. G. A. Simard, Montreal, and New Brunswick, Mr. W. A. Anderson, St. John.

Those for Nova Scotia and Prince Edward Island will be selected by the executive at a later date.

A Successful Banquet

On October 11 the delegates were entertained to luncheon by the Winnipeg city council at the Royal Alexandra Hotel. His Worship Mayor Waugh was in the chair and the guests included Lt. Gov. D. C. Cameron and the Mayor of St. Boniface. Tributes to the value of the work of the Highway Association were paid by all the speakers. The keynote of the addresses was that the success of the movement depended upon educating the people and interesting the legislators.

Mr. P. W. Luce, New Westminster, Secretary Canadian Highway Association

The next annual meeting will be held in Toronto.

History and Work of the Canadian Highway Association

The association was organized at a good roads convention, held at New Westminster, B.C., November 3 and 4, 1911. The primary object was to secure support for a project for building a highway throughout Canada. Resolutions were forwarded to Halifax, N.S., Alberni, B.C., Hazelton, B.C., and Dawson, Yukon Territory. Other resolutions calling for federal assistance were sent to Ottawa, while similar resolutions asking for provincial aid were telegraphed to Victoria. These resolutions have been drafted and sent to the different governments and municipalities through which the proposed highway is to pass.

Another project which is endorsed by the association is to have the Canadian section of the Pacific Highway completed. In general, the association has undertaken to promote good roads through the Dominion; to endeavor to have all public moneys expended on roads spent to better advantage; to show the members of Parliament that the people want permanent roads; to carry on a campaign of education in order to enlighten the government and the people regarding the benefits which will be derived from good roads; to cooperate with the different governments with a view to bettering the standard of roads for which federal or provincial grants are made and to capitalize the climate and scenery in building roads that will bring tourists from all parts of the world. Branches are to be established in various sections of the Dominion.

The route of the proposed highway runs as follows: Alberni to Victoria, via Nanaimo, Vancouver, New Westminster, Chilliwack, Hope, Princeton, Rossland, thence to Trail, crossing the Columbia by the new bridge now in course of erection, and via Summit Creek, along the old Dewdney Trail to Creston, thence following the main Trunk Road into Alberta. From the British Columbia boundary the road will extend almost directly to Macleod, thence to Lethbridge and Medicine Hat, partly over the old surveyed trail and partly on road allowances. From Medicine Hat the route is through Coleridge, Irvine and Walsh, thence on to Maple Creek, just outside the boundary line.

Entering Saskatchewan the road heads almost directly for Swift Current, whence it follows closely the Canadian Pacific Railway to Waldeck, thence east across Lake Chaplin, following the north boundary of township 16 through Moose Jaw to Broadview, and from there following a southwesterly direction, part of the way on surveyed roads paralleling the Canadian Pacific Railway main line to Fleming, thence due east to the Manitoba boundary. In Manitoba the road goes through the cities of Brandon, Portage la Prairie and Winnipeg. The road along the Great Lakes is not yet outlined, but it is the intention to touch at Port Arthur, the Soo, Parry Sound, and then head almost due east for Ottawa. From there the route is towards Montreal, passing probably towards Sherbrooke, where it will swing northeast paralleling the boundary line of the state of Maine, thence through New Brunswick and Nova Scotia to Halifax, touching at Moncton and Truro.

This route is subject to change and several suggestions have been made for modifications.

Hon. Frank Cochrane, Minister of Railways and Canals, has returned from a tour of inspection over the Welland Canal. While it is well known that the Government is anxious to hasten the construction of this work, it is realized that owing to a lack of information, which is necessary for specifications, it will be impossible to let any contracts until next spring. Engineers are now at work, however, taking borings and securing the required information. There is every reason to believe that next year will see the commencement of the actual contract work.

Work has now been started on the Seamen's Institute and the Connaught library in Victoria, H.R.H. the Duke of Connaught having laid the corner-stones of these two buildings.

An explosion which took place in the brick plant of the Red Cliff Clay Products Company of Medicine Hat caused damage estimated at $10,000.

Montreal — The Commercial Metropolis

The History of its Constructional Development—A History Teeming with Interest for the Engineer, Architect, Contractor and Municipality*

MONTREAL, the commercial metropolis and national port of Canada, began its real municipal existence in 1833, when the first Mayor and Council were elected. The city has had various forms of government since 1643, when it was established by Paul de Chomedy, Sieur de Maisonneuve, but it was not until 1833 that it was given a charter. When Montreal was founded the Governor sent by the Sovereign from France had royal powers with the exception of a direct appeal to the King. Apart from the Governor-General, there was a special governor appointed to administer the affairs of Montreal. The Governor administered all the affairs of the city, being practically dictator and giving no account of his acts except to the King. He was magistrate and military commander, and was nominally subject to the authority of the Governor of Quebec, but in consequence of the distance between the two cities and the lack of means of communication, this authority was rarely exercised. On the charter of the Associates, who obtained a concession of the island of Montreal, being remitted to Louis XIV, the King re-established his sovereign authority and De Tracey was sent out as Viceroy. One of his first acts was to revoke the appointment of the Sieur de Maisonneuve as Governor of the city. Under the administration there was an officer known as the Syndic, who acted in local affairs as a Censor, his duty being to take note of all infractions of the rights of the public and to denounce violations of the law. Another part of his duties was to act as representative of the people, with the object of protecting their rights under the law, but this part of his office received scant recognition on the part of the authorities. On October 7, 1663, at a meeting of the inhabitants of Quebec an attempt was made to institute municipal government, and De Repentigny was elected Mayor, and two councillors were also appointed, but the Superior Council promptly revoked the elections and ordered the election of a Syndic by the people. In 1672 Frontenac was made Governor, and he called a meeting with the object of electing three aldermen, but this proved a fiasco. The old form of government continued for many years, and dozens of ordinances for bettering the condition of the city were put into force. Thus, in 1707, Jacques Raudot passed an ordinance establishing two market days, and these are in force at the present time.

The City Under British Control

In 1763 Montreal passed into British possession, and in October of that year the early military regime was abolished. General Murray, the Governor General, administered both municipal and provincial affairs, with the assistance of an executive council composed of the governors of Montreal and Three Rivers, the chief justice, inspector of customs, and eight of the principal citizens. In 1791 Canada was divided into two provinces, each with its own parliament and executive council. In the province of Lower Canada parliament exercised, in local affairs, many powers which are now possessed by municipal councils, and the justices of the peace nominated by the executive saw to the carrying out of the by-laws relative to the municipalities.

Municipal affairs at the commencement of the last century were partly administered by a number of justices of the peace. Thus they took upon themselves such duties as fixing the price and weight of bread. These regulations were codified in 1810 and received the sanction of the judges of the Court of King's Bench. In 1800 an engineer was appointed by the legislature, at an annual salary of £200, whose duty it was to open up and maintain the streets, his jurisdiction extending beyond the old limits. From this time marked progress was made in improvements, particularly in connection with the streets. Paving the streets had claimed some attention under the French regime, and in 1676 it was ordered that each proprietor must pave up to the middle of the street in front of his own property, but at the time of the conquest this law had fallen into abeyance. The new engineer seems to have been an enthusiastic worker and in a short time a number of streets were paved and many opened up. At this time also the construction of the esplanade known as the Champ de Mars was commenced. This is being laid out anew.

The First Charter Granted

For some years the inhabitants had been asking the legislature for reforms in connection with the administration of municipal affairs, and on December 6, 1828, a large meeting was held at which their demands were formulated. These were sent to the legislature, and in 1830 the harbor commissioners were incorporated. Three years later Montreal obtained its first charter, under which the city was divided into eight wards; the council consisted of sixteen members, of which seven formed a quorum. The Aldermen were elected by the people, while the mayor, with a salary of $400 per annum, was elected by the Council. The first meeting of the Council was held on June 5, 1833, when Mr. Jacques Viger, whose name is commemorated by a public square in the city, was elected Mayor. Before coming into force, the regulations decided on by the Council had to be submitted for approbation to the Court of King's Bench, after having been published in the newspapers and proclaimed by the public criers.

The charter remained in force until 1836, when it automically lapsed, Parliament refusing to renew the charter, to the great detriment of the city, which had to return to the old system of administration by justices of the peace. Lord Durham, in his famous report, refers to the cities of Montreal and Quebec as being without municipal government, the streets being in a disgraceful condition and the cities without lighting systems. In 1840 Montreal received another charter,

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* The second of a special series of articles on the leading Canadian cities inaugurated with Ottawa in our issue of October 2, 1912.

MONTREAL

A panoramic view of the Montreal of 1912

this time from the special Council then sitting in the city. The Governor-General, the Hon. C. Poulett Thomson, was authorized to name the first members of the Council, whose term finished in December, 1842. A majority of the members were English, the Council being composed as follows: Mayor, Mr. Peter McGill; Council, Messrs. Jules Quesnel, Adam Ferrier, C. S. Rodier, J. G. Mackenzie, C. S. DeBleury, J. M. Tobin, Oliver Berthelet, F. Bruneau, Hypolite Guy, John Donegani, Charles Tait, J. W. Danscomb, Thomas Phillips, Colin Campbell, Stanley Bagg, Archibald Hume, D. Handyside, and William Molson. The population at this time was 40,000. At the following election, the French Canadians elected a majority of the aldermen.

Growth of Debt

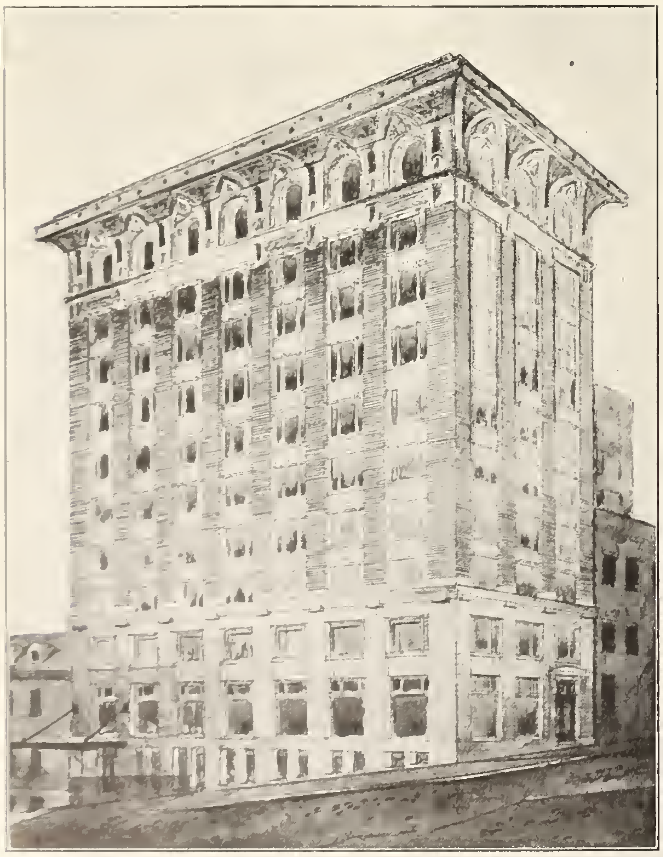
In 1841, following the fusion of the two parliaments, a new charter was granted to Montreal, and the fresh council elected made great improvements in the city. From then on the Council has, from time to time, amended its charter to meet the needs of the city, with its growing population and fresh problems.

The city of Montreal in 1812

To provide for these demands the debt of the city has been enormously increased. In 1868 authority was given to consolidate the debt and bring it up to 5 million dollars, by 1878 it had grown to 11 millions, and it is now $52,325,000, with the prospect of still being added to. In 1911 31 per cent. of the total city's revenue was set aside for interest charges. Various new departments have been added, and in every direction fresh works of a permanent character have been carried out. At various periods, as the city has expanded, the outlying districts have been taken in, and whereas in 1883 the area of the city was 3,494 acres it is now 33,100 acres. Some districts still retain their independence, notably Westmount, which is the finest suburb around Montreal, and which has attained the dignity of a city with its own council and officials.

Cleansing Municipal Politics

In some respects Montreal has been slow in accommodating itself, municipally, to new conditions, due in a degree to the mixed character of the population; but recently there has been an awakening in this direction, and at the beginning of 1910 the people effected a complete revolution in the personnel and methods of local government. For a long period prior to this there had been vehement protests against what was known as the "23"—a group of members who controlled the Council, and whose policy and acts were denounced on every hand. Charges of graft were freely made, and as an outcome the Provincial Government appointed in 1909 Judge Cannon to investigate the procedure and acts of the Council. Voluminous evidence was taken, and the Judge in his report condemned the conduct of several members of the "23." It was in some respects a scathing denunciation of the "23," particularly in relation to the letting of paving contracts to middlemen, who made huge profits. A committee of prominent citizens was formed, and when the next elections occurred the aldermen implicated in the report met with overwhelming defeat. One result of the investigation was the appointment, by the electors, of four commissioners who had the control of various departments. Dr. James J. Guerin, the new Mayor, was an ex-officio member of the Board, which consisted of Messrs. J. Ainey, L. N. Dupuis, E. P. Lachapelle, and F. L. Wanklyn. This latter gentleman retired this year and is succeeded by Mr. C. H. Godfrey. Although there has been a great improvement in the government of the city, notably in the way of expediting municipal work, some of the aldermen are opposed to the commissioners and favor a return to the old system, under which aldermen exercized a great deal of patronage—a system condemned by Judge Cannon. It is generally admitted that the Commissioners have too much to do, and that Aldermen can, if so disposed, hamper the work of the Commissioners.



The Unity Building, a $300,000 structure now in course of erection. Architects, Messrs. Finley & Spence

Proposed Shaughnessy Building being erected for the president of the C.P.R. according to the plans of Messrs. Hutchison, Wood & Miller. General contractors, Messrs. Peter Lyall & Sons Construction Company, Limited

The Commissioners reorganized the departments, with a view to obtaining better results, and decided that the road, water, sewer, and building inspection departments should be under the direction of one officer directly responsible to the Commissioners. Mr. George Janin, superintendent of the water department, was appointed with the title of chief engineer. Mr. Barlow, the city surveyor, was given the title of engineer superintendent of the road department; and Mr. Stuart Howard, the assistant surveyor, is the engineer in charge of sewers. Mr. Alcide Chausse is the superintendent of buildings, and Mr. J. E. Dore, sanitary engineer, while Mr. T. W. Lesage is superintendent of the water works. Senator David is the City Clerk; Mr. Arnoldi the City Treasurer (succeeding Mr. William Robb, who was in the employ of the city for 47 years, and did excellent service for the citizens), Mr. J. Pelletier, City Controller, and Mr. N. J. Smith, city cashier. Dr. J. E. Laberge is at the head of the health department.

How Montreal Has Grown

As evidence of the strides made by the city, the growth of the population may be cited, and the following figures show at a glance the marvellous progress in this direction:—

Year	Population
1760	3,000
1800	9,000
1825	22,000
1851	57,000
1861	91,000
1871	107,000
1881	211,000
1901	266,000
1913	530,400
1913 (Greater Montreal)	602,400

The assessed valuation of property is $689,000,000, an increase of $159,000,000 over 1911. In several wards the increase of taxable property was 30 per cent.

The new Vineberg Building, designed by Messrs. Dufort & Decary and built by the Atlas Construction Company

The Kellert Building, a steel and concrete structure faced with ornamental terra cotta and built at a cost of some $250,000. Messrs. P. Lyall & Sons, contractors.

During the past two years Montreal has had a building boom. This has been accompanied by extensive speculation in real estate, enormous sub-division of outlying land, and a very pronounced advance in the price of city property. In order to get an adequate return on the values, it has been imperative to rebuild, and in every direction new structures have been, and are, going up. The increasing population has rendered additional accommodation necessary, and thousands of small and large flats, apartment houses, and residences have been constructed. Quite a feature has been the erection of extensive office buildings, and more of these are being constructed, while several others are planned. Contractors never were so busy as now, and as the growth of the city seems assured, the outlook is distinctly promising. The following table of official permits tells the tale of the boom, although it should be added that the figures greatly underestimate the value of the buildings. For one thing, true cost is rarely given, in order to save the fees of the building department, and in the next place, many of the municipalities, which are included in Greater Montreal, either make no returns or their returns are not included in the figures quoted. No municipal work or work done by the Harbor Commissioners is included. It is not therefore putting the case too high to say that at least a third more should be added to the figures issued by the city building department.

Year	Value of Construction
1899	$ 2,370,080
1900	3,089,403
1901	2,368,372
1902	3,089,731
1903	4,094,596
1904	5,651,164
1905	5,500,608
1906	8,639,388
1907	8,106,299
1908	5,062,926
1909	7,785,621
1910	[illegible]
1911	[illegible]
1912 (up to September 30)	[illegible]

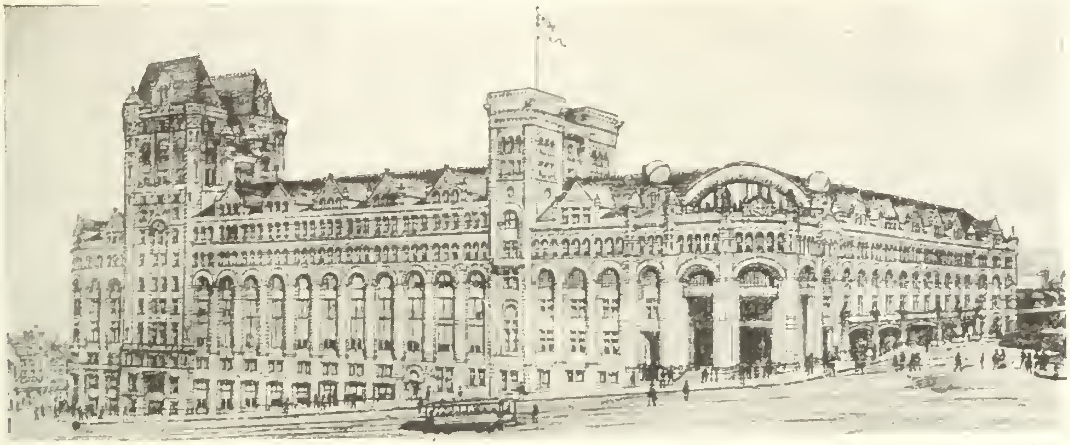
In dealing with this subject, it is right to mention that there have been continued protests against the inadequacy of the building by-laws. It is recognized that they are very far from what they should be, and a committee has been for a long time engaged in revising them; but the work is slow, and the committee has complained that the City Hall authorities have not rendered that assistance which they might naturally have been expected to give. It is officially stated, however, that the new code will be ready in October, and that it will be very complete. The building inspector's staff is inadequate, considering the amount of work it is supposed to do, and the arrangements at the City Hall are a model of what they ought not to be, so far as expediting the business of the superintendent is concerned. The rebuilding of the city—if that term may be allowed—is not confined to any particular class of structure. New and magnificent churches, railway stations, schools, apartment houses, banks, and office buildings are all represented, and in the down-town section in particular there has been a marked change in the character of the buildings. Moreover, some of them are, from the architectural point, of great merit, for Montreal can boast of architects who in competitions have carried off the highest prizes. The buildings are provided with all the best devices for comfort and labor saving that can be purchased. The most noteworthy additions to the city's buildings are the extension of the Windsor Station, which is now nearly complete, and a portion of which is occupied; and the Transportation and Dominion Express Buildings, two mammoth offices equal to any in the Dominion. The Jacobs building on St. Catherine street is another recent structure, while earlier than these were the Canadian Express and Grand Trunk Offices, both on McGill street; on the same thoroughfare two big structures, one for Sir Thomas Shaughnessy and another for a syndicate, are now in course of erection. Other fine buildings now being erected are the Royal Trust, the Bank of British North America, the Duluth Building, La Sauvegarde, the Unity Building, the Alexandra Building, J. C. Wilson Building, Johnston Building and the Lewis Building.

Mention may be made of the New Birks Building, Blumenthal's building, the new office of the Gillette Razor Company, the Vineberg building, the new "Herald" office, the extension to the General Post Office, the new Y.M.C.A., and the contemplated addition to the City Hall. From the educational standpoint, some fine buildings have been recently finished. There is, for instance, the new Medical Building at McGill University, the Technical School erected by the Provincial Government, the Art Gallery, and a number of excellent schools. A public library, to cost $700,000 is being erected by the Gentlemen of the Seminary. The Ritz-Carlton Hotel, now being erected, promises to be a splendid addition to the city's hotels, while the C.P.R. are remodelling their Place Viger Hotel. Several of the banks have lately spent much money in providing elaborate accommodation, and on St. James street there are the fine premises of the Canadian Bank of Commerce and the Royal Bank of Canada. The most noticeable feature in the construction of all the recent buildings is the employment of reinforced concrete, the fine interior finish, including the use of marble, and the efforts to secure really fire-proof buildings.

New Fire and Police Station, Notre Dame de Grace. Architect, Mr. Theo. Daoust; contractor, Mr. Jos. Marcotte

Waterworks, Old and New

Apart from the waterworks, the city does not possess any public utilities, the lighting, tramcars, power plants, etc., being in private hands. The first attempt at a systematic supply of water was made in 1801 by a company which used 4-in. wooden pipes to convey the water into the city; in 1815 a new concern purchased the rights of the company, and substituted



The C.P.R. Windsor Station, the largest and most complete railway headquarters in Canada

The new Birks Building, a reinforced concrete structure designed by Messrs. Nobbs & Hyde and built by Messrs. F. J. Jago & Company

The Blumenthal Building. Architects, Messrs Mitchell & Ogilvy; contractors, T. G. Loomis & Sons. Structural design, Trussed Concrete Steel Company.

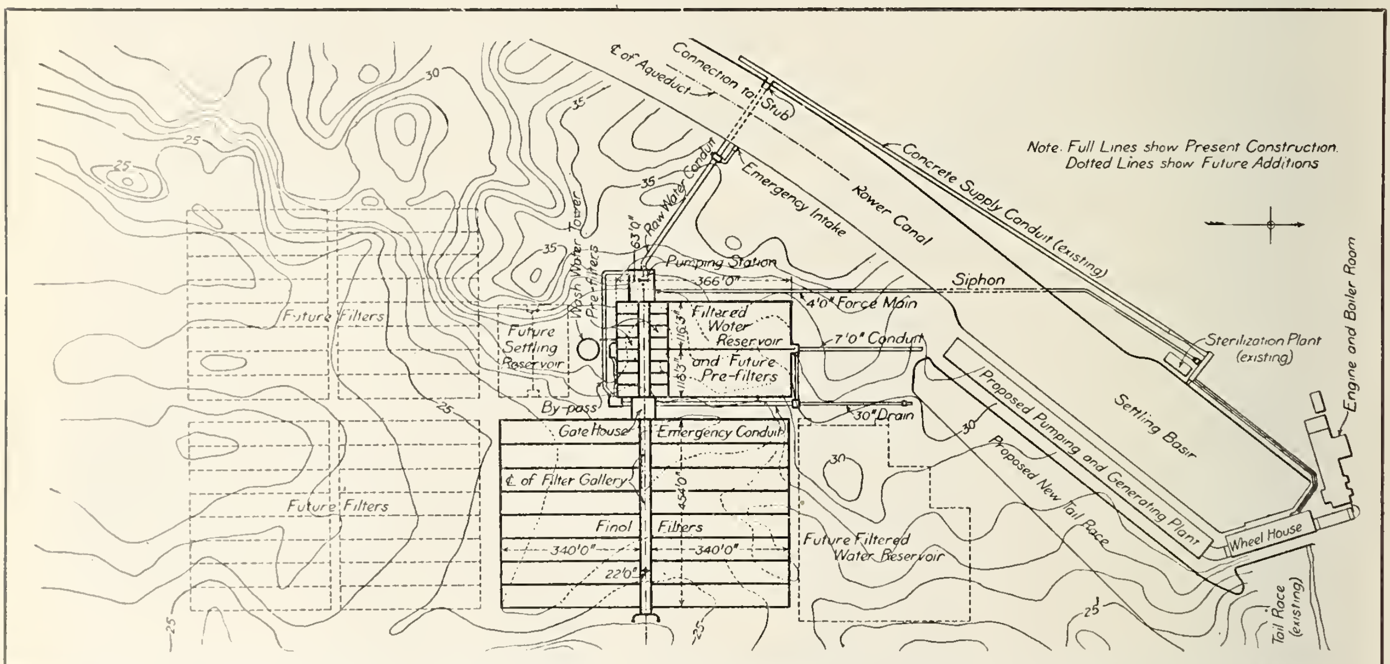
The new Medical Building at McGill University, designed by Messrs. Brown & Vallance and built by Mr. E. G. M. Cape iron pipes, bringing the water from the St. Lawrence by steam pumping. Ultimately the city purchased the aqueduct and works for £50,000, and in 1865 a new aqueduct was built, the water being taken from the Lachine Rapids, and raised by hydraulic pumps to a reservoir on the mountain. Mr. T. C. Keefer, consulting engineer, prepared plans to furnish the reservoir with 4 million gallons daily. The aqueduct consisted of an open canal six miles long, with a pumping station at Point St. Charles, the total capacity of the reservoir being 15,000,000 gallons. As the population increased, new facilities were added, and in 1874 a beginning was made on widening the aqueduct or building a supplementary one, while later an addition to the reservoir was made. In 1902 the storage capacity was 37,000,000 gallons, the pumping capacity 30 million gallons daily, and the consumption 24,000,000 daily.

This system, with the addition of new pumps as necessity arose, was in use for many years, and is now in course of reconstruction, the city having decided that the time has come for a remodelling of the waterworks. It was first of all agreed to widen the aqueduct to 149 feet at the top with earthen banks on each side, and this work has been in operation for two years, the contractors being Messrs. Haney, Quinlan & Robertson. In order to bring the water from the St. Lawrence to the pumping house while the widening is being done a conduit of 80 million gallons capacity was constructed, and the water runs through this to Point St. Charles, where it is pumped for the supply of the city and into the reservoir. This conduit is 9 ft. in diameter, and is built of concrete . The object in widening the aqueduct is to obtain additional power to generate 6000 horse power, to be used in pumping the ordinary water supply. Recently, however, powers have been obtained to still further widen the aqueduct to 172 feet, in order to secure an additional 4000 horse power with a view to lighting the city. The plans have now been prepared, and provide for the construction of almost vertical concrete walls. The total cost of the scheme will be about 5 million dollars, of which $2,000,000 will be spent on the public lighting system. In connection with the improvement a contract was let in 1910 for two 72-inch steel intake pipes connected with a concrete crib, situated in the St. Lawrence River at 1,200 feet from shore, the price being $155,000.

Water Sterilization

At present the water is sterilized by hypochlorite of lime treatment, at the Point St. Charles pumping station. This system consists of the use of ordinary chloride of lime diluted in water, and applied to water in the conduit before passing through the pumps. The amount of chloride employed varies according to the seasons and the nature of the water, but the usual proportion is a half part for each million parts of water to be sterilized. This small proportion gives very satisfactory bacteriological results of efficiency of the treatment, about 99 per cent. of the bacteriae in the water treated is destroyed, and there is a complete destruction of all the bacteria attributable to sewage water. The method of sterilizing the water costs about 33 cents per million Imperial gallons pumped. But this system may be regarded as only temporary, as there is now being constructed a filtration system from plans by Messrs. Hering & Fuller, consulting engineers, of New York City, which was fully described in the Contract Record of September 27, 1911. This plant will cost about $1,500,000 and is designed for a capacity of 50,000,000 imperial gallons daily, with provision for enlarging it to three times the size. Double filtration and sterilization with hypochlorite is the method chosen.

The main pumping station is the low level station at Point St. Charles, where steam power is employed to supply the city and pump the water to the main reservoir at the high level station, McTavish street. The steam pumps at the McTavish street station force



Plan of filtration plant now under construction. This is designed for a capacity of 50,000,000 imperial gallons daily and will involve an expenditure of $1,500,000. The contractor is Mr. N. McLeod ; Messrs. Hering & Fuller, of New York City, were the designers.

Site of drydock, Maisonneuve

the water to the high level reservoir at the slope of the mountain. A supplementary high level pumping station is on Papineau avenue, where a 6 million gallon pump deals with water for the northern part of the city. The city is, in the nature of things, constantly adding to the general pumping capacity, and a 12 million gallon turbine has just been installed. When the alterations to the aqueduct are completed and the new filter system is finished, the pumping arrangements are to be remodelled. The following table shows the cost of raising to an altitude of one foot, one million gallons of water by water power and by steam respectively:

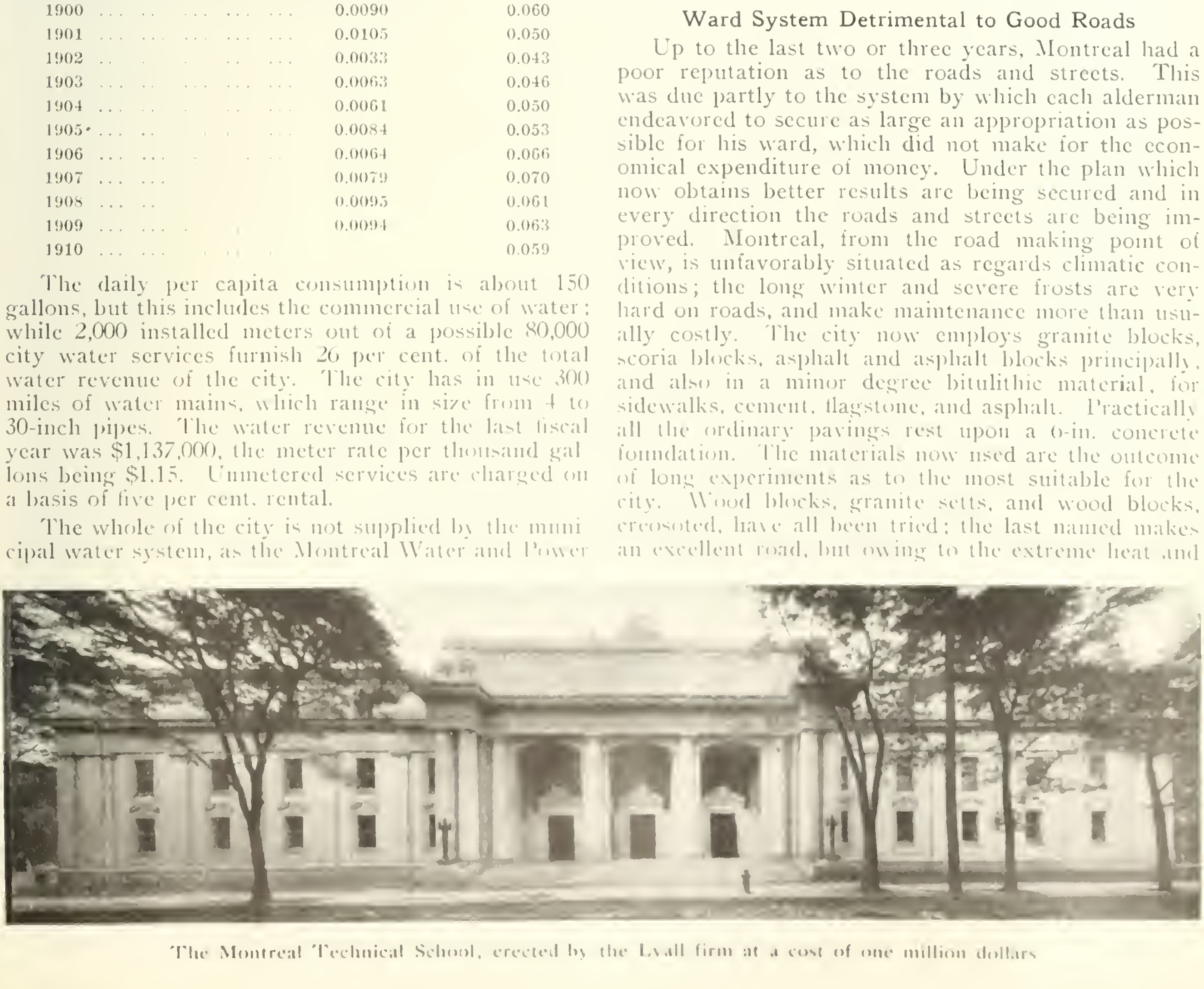
Years	Water Power	Steam Power
1900	0.0090	0.060
1901	0.0105	0.050
1902	0.0033	0.043
1903	0.0063	0.046
1904	0.0061	0.050
1905	0.0084	0.053
1906	0.0064	0.066
1907	0.0079	0.070
1908	0.0095	0.061
1909	0.0094	0.063
1910		0.059

The daily per capita consumption is about 150 gallons, but this includes the commercial use of water; while 2,000 installed meters out of a possible 80,000 city water services furnish 26 per cent. of the total water revenue of the city. The city has in use 300 miles of water mains, which range in size from 4 to 30-inch pipes. The water revenue for the last fiscal year was $1,137,000, the meter rate per thousand gallons being $1.15. Unmetered services are charged on a basis of five per cent. rental.

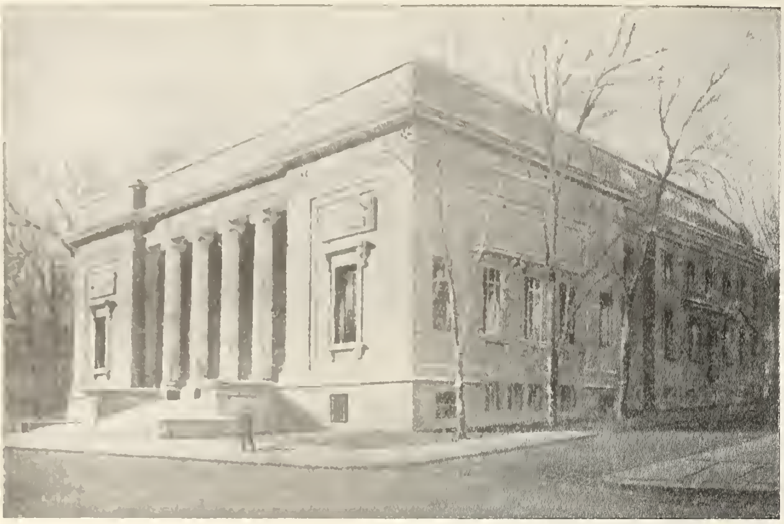
The whole of the city is not supplied by the municipal water system, as the Montreal Water and Power Company have mains and supply water to five outlying wards of the city. The system is an important one, as will be seen from the fact that last year the revenue was $506,500. The company are putting in a new filtration plant, which was described in our pages on March 13 last. It is of the rapid gravity, sand bed type, and is designed to treat 30 millions U.S. gallons daily. The plant is now in partial operation. The company are also putting in a new reservoir, and have ordered an additional two ten million gallon pumps. The total number of services is nearly 42,000. For a long time the city have been in negotiation with the company to purchase their property, but there are differences as to the basis of valuation.

Ward System Detrimental to Good Roads

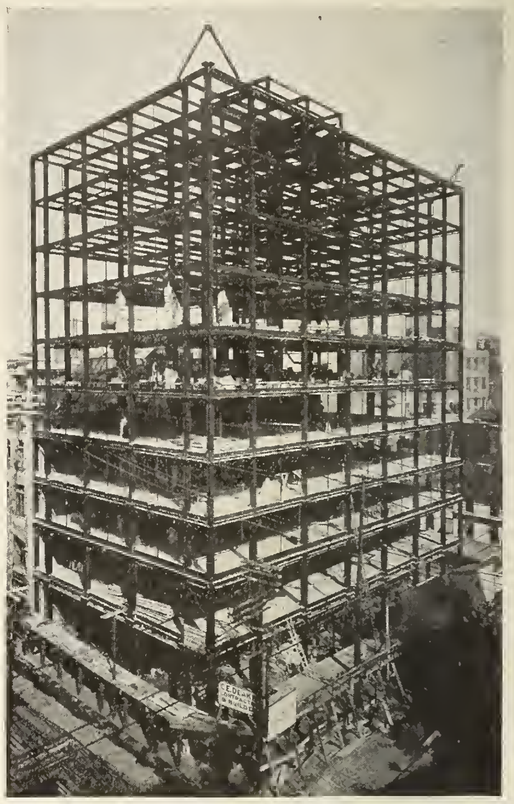
Up to the last two or three years, Montreal had a poor reputation as to the roads and streets. This was due partly to the system by which each alderman endeavored to secure as large an appropriation as possible for his ward, which did not make for the economical expenditure of money. Under the plan which now obtains better results are being secured and in every direction the roads and streets are being improved. Montreal, from the road making point of view, is unfavorably situated as regards climatic conditions; the long winter and severe frosts are very hard on roads, and make maintenance more than usually costly. The city now employs granite blocks, scoria blocks, asphalt and asphalt blocks principally, and also in a minor degree bitulithic material, for sidewalks, cement, flagstone, and asphalt. Practically all the ordinary pavings rest upon a 6-in. concrete foundation. The materials now used are the outcome of long experiments as to the most suitable for the city. Wood blocks, granite setts, and wood blocks, creosoted, have all been tried; the last named makes an excellent road, but owing to the extreme heat and



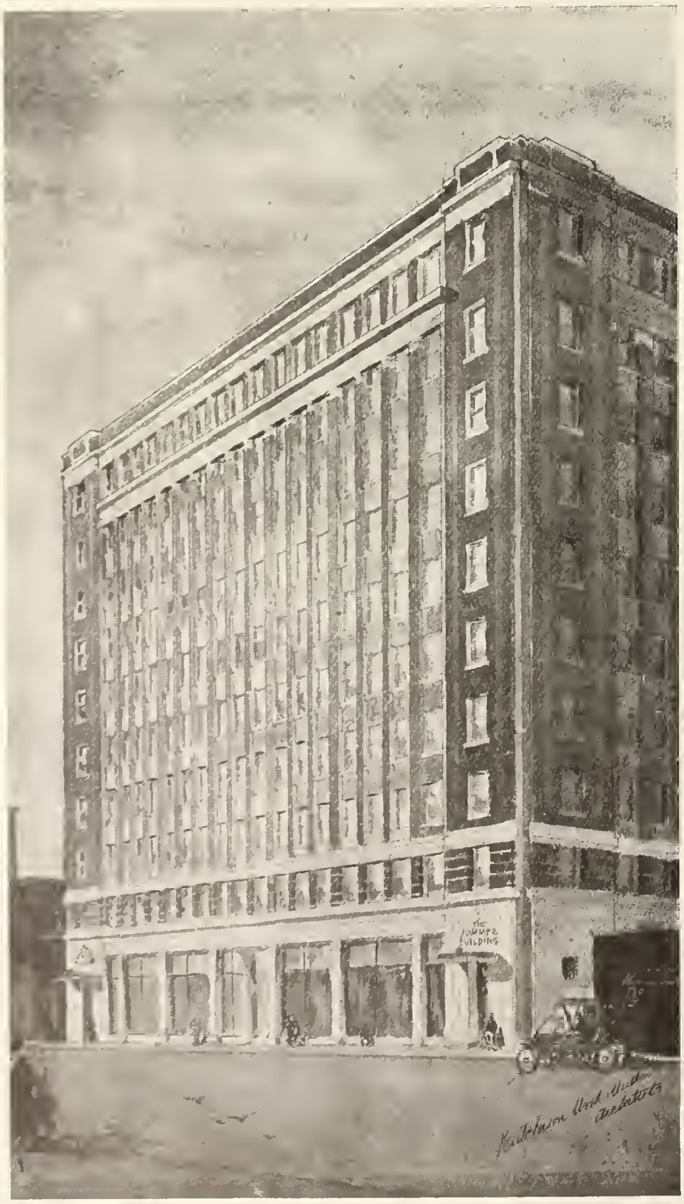
The Montreal Technical School, erected by the Lyall firm at a cost of one million dollars



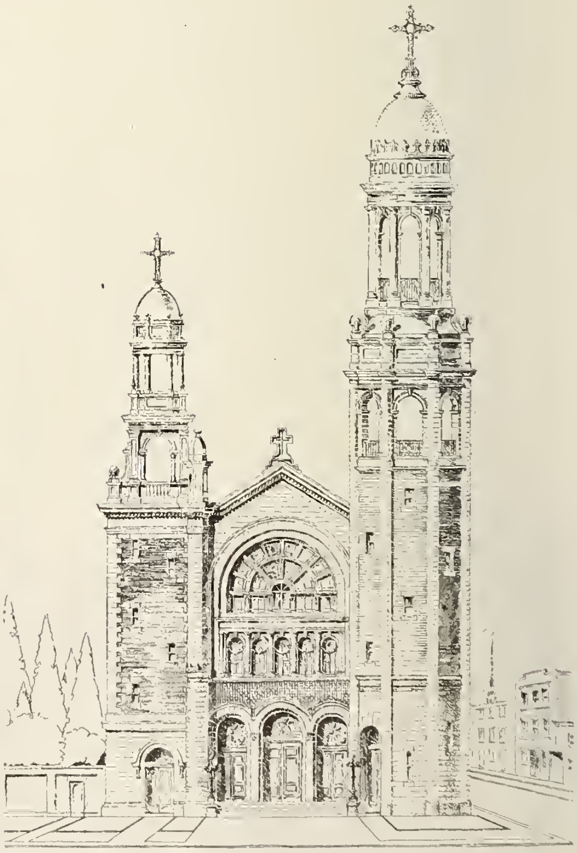
New Art Gallery, Montreal. Architects, Messrs. E. & W. S. Maxwell; contractors, Messrs. Geo. A. Fuller Co., Ltd.



The 10-storey building which is being erected at the corner of McGill and Notre Dame Streets, for the McGill Syndicate. Architect, Mr. R. E. Bostrom



Proposed building for A. Sommer & Co., Montreal. General contractor, Mr. C. E. Deakin



Proposed St. Irenee Church, designed by Messrs. MacDuff & Lemieux. Estimated cost, $140,000 cold the blocks were forced up from the base and consequently they had to be abandoned.

Within this last two years there has been a great improvement, not only in the maintenance of the roads, but also in the construction. The grade of the concrete, owing to the use of mechanical mixers, has been more uniform; none but perfectly screened stones have been accepted, while the quality of the cements has been better. The city is in fact proceeding on a more defined system, the result of which will be even more apparent in two or three years. No roads or pavements are now laid until the sewer and water pipes are laid.

The majority of the roads are 36 feet from curb to curb, with 12 feet on either side for sidewalks. All the new thoroughfares are made 42 feet wide, with the 12 feet allowance for sidewalks. In the outlying districts the Council has used tarvia and similar preparations with great success. They prevent dust, and although the first cost is high as compared with watering, the small maintenance charges more than offset the heavier initial expense. In addition, watering only has a temporary effect on dust laying, whereas tarvia prevents the accumulation of the dust.

The 10-storey Read Building as it will appear upon completion. This structure will contain a total floor area of some 300,000 square feet and will involve an expenditure of nearly one million dollars. Architects, Messrs. Ross & McFarlane

Day Labor and Contract Work

Most of the road work is done by day labor, the officials favoring this as compared with contract work, on the ground that it is generally more satisfactory. The council, in inviting tenders for the roads and sidewalks, reserves the right to tender on its own account, and the roads department accordingly sends in its own estimates. In the event of these being the lowest, the work is carried out by day labor, the department having all the necessary machinery and obtaining the material by tender. The city is the owner of a quarry for macadam. This year a big programme has been adopted, paving being carried out on 25 street sections; when completed there will be a material addition to the 75 miles of streets that were paved at the close of last year.

With regard to making up new roads, in the case of macadam the cost falls upon the city, but where other materials are used the proprietors have to pay all the charges, except where a street is over 50 feet wide from curb to curb, and in these instances the city pays the cost of the extra width. The cost of the sidewalks is shared equally by the city and proprietors. When the council decides to make up a road, the owners have the privilege of objecting, and should there be a majority against the improvement the council has the right to proceed with the work and apportion the cost according to the proportion belonging to the various proprietors. Recently the Council decided to seek authorization to repeal the local improvement law by which the cost of paving is paid by the owners of property. The cost will be paid out of the general funds of the city.

One of the chief problems to be dealt with by the department is the removal of snow and ice, part of the cost being borne by the Tramways Company. In case of heavy storms the department has to imme-

Grain elevator No. 2, one of the largest reinforced concrete elevators in the world, opened on the 2nd instant by the Minister of Marine and Fisheries

The Transportation Building, an expeditious piece of work completed by Messrs. Peter Lyall & Sons this year at a cost of approximately one million dollars

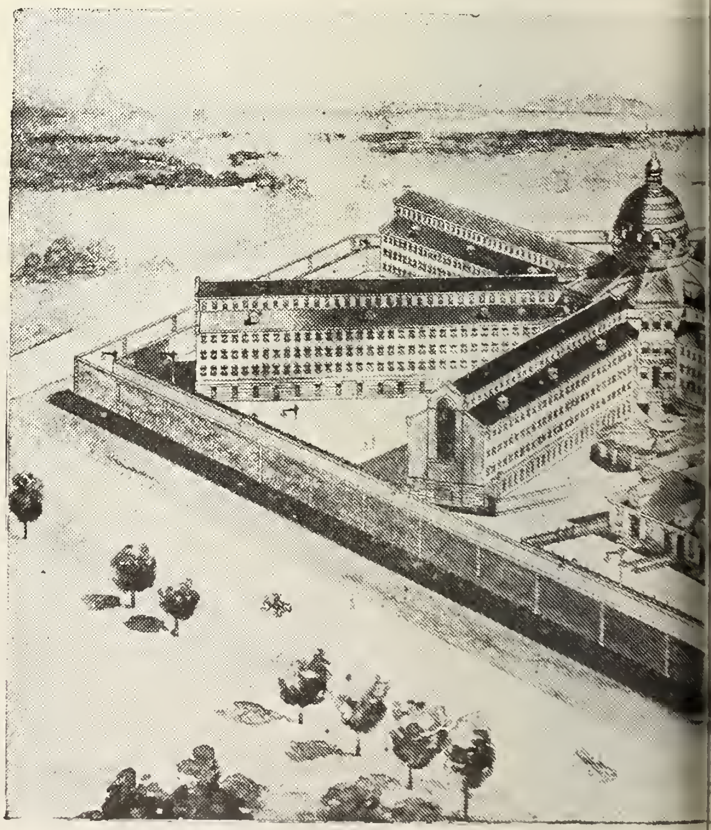
diately gather a large force of men to deal with the snow, and it requires a considerable amount of organization to deal effectively with these emergencies. The city also cleans all the sidewalks in winter, charging the proprietors 5 cents per foot front.

The City's Sewerage System

Although the drainage of the city dates from a very early period, no records or plans are available at the City Hall before the year 1841, at which time the city was very small, being bounded by the river, Craig street, McGill and Barrack streets. Since that date miles of sewers have been built, and at the end of the year 1911 the city had 316.32 miles constructed. During the present year 40 miles of sewers have been started and will probably be completed. Sewers are constructed on a combined system, that is to say, carrying both house sewage and storm sewer. The main sewers drain mostly into the River St. Lawrence without purification. The Back River now receives one large main sewer from St. Denis Ward, the sewage being purified, and two large main sewers are now under construction, one draining Outremont, Laurier and St. Denis wards, the other Notre Dame de Grace and Mount Royal wards.

During the time of high water in the River St. Lawrence, the outlets into the river are closed, and the sewage is pumped into the river, so as to prevent floodings in the lower sections of the city. The city also drains the city of Westmount, via Dorchester and St. James streets. The largest main is 8 ft. 0 in. in diameter, and the smallest sewer now being constructed is 2 feet by 3 feet, egg shaped, this shape having been found the smallest which will admit of perfect cleaning by hand. Any small tile sewers constructed in the past have to be cleaned by flushing. The sewers are all constructed in brick, but in future concrete will be tried for large sewers. One large sewer in Longue Pointe has been constructed of reinforced concrete and brickwork, in which has been placed the large water mains, easily seen and repaired. This is a departure from the regular practice so far as Montreal is concerned. The sewer is an eight-foot one, and Chief Engineer Janin is of opinion that the experiment will be successful. Sewers of this description are common in Europe. It may be remarked that there is no danger from contamination, as the pressure being on the inside of the pipe, the water, in the event of a break, would force everything out from the sewer. The water main is constructed on a ledge at the side of the sewer, and ordinarily it would not be immersed in the sewage, as the latter is carried in a sluice way at the bottom of the sewer. In the spring time, however, when the melting snow

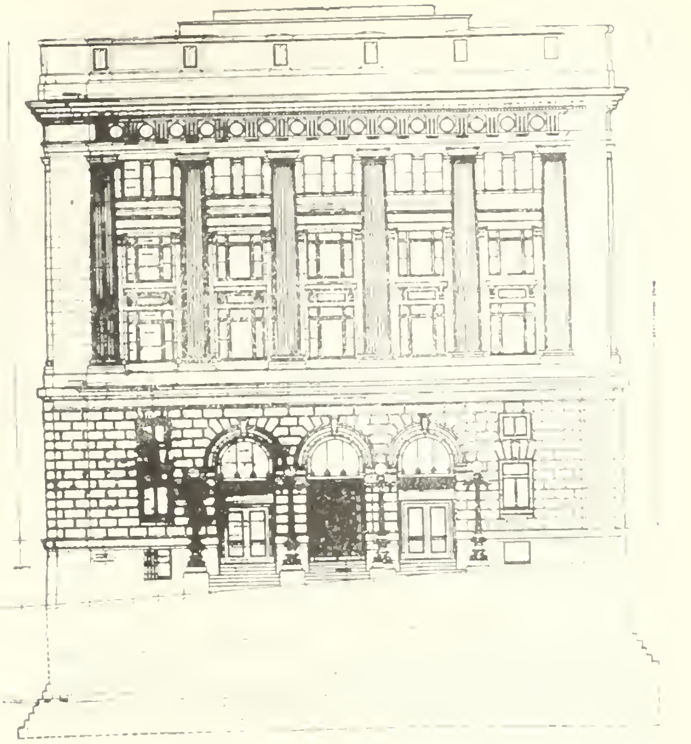
Exterior view of Mont



The new Montreal Jail, completed (except for one wing)
Marchand & Haskell; c

mpany's filtration plant

adds to the volume of water, the entire interior of the sewer might be filled. In order to meet the new conditions, the manholes in the sewer are made at an angle so as to enable repairers to get inside an iron pipe if needed for repairs to the water main, which is 16 inches in diameter.



Front elevation of proposed City Hall Annex. Architects, Messrs. Marchand & Haskell

There are two sewage farms, one in Notre Dame de Grace and the other in Upper St. Denis Ward, the latter constructed some fifteen years ago by Mr. Janin. The Notre Dame de Grace farm, however, is practically useless, and in view of this the city have decided to build a trunk sewer, referred to above, from Notre Dame de Grace to Cartierville, a distance of five miles. This will be in three sections at a total approximate cost of $750,000, and the first section will be commenced this fall. The big programme of sewer making is necessitated by the recent annexation of outlying districts. Dr. Laberge, the medical officer, believes that all sewage should be treated before it is allowed to be disposed of in the river. The Mayor agrees with this view, but points out that the city has no money to spend on treating sewage. In regard to the proposal for the new sewer, the river at the spot where the new sewer will empty itself is very rapid, so that the danger of contamination is practically nil.

mately two and a half million dollars. Architects, Messrs. J. B. Pauze & Company.

Big Developments at the Harbor

From the period when the Harbor Commissioners were appointed for business, and not for political reasons, there has been a great development in the port's trade. Millions of dollars have been spent on extending the facilities which are necessary to cope with the port's expanding business, and the whole of the water front on both sides of the river is now under the jurisdiction of the Commissioners. The total water area is 12,000 acres and the total land area, improved, is 200 acres. The port type is a combination of a protected tidal basin, riverside quays, and pier jetties; an artificial embankment, parallel to the shore, about one and a third miles long, protecting the whole of the upper part of the harbor from river current and ice shoves. Timber cribwork is the type of quay wall construction, and within the last few years concrete has been adopted instead of wood for the part above water. Fireproof harbor sheds have lately been constructed, and it may be mentioned that all the sheds are lit by electricity. Although the construction of some features is of a substantial and permanent character, it could not be expected that the wharves, embankments or the general character of the harbor would be on the finished, symmetrical and comprehensive scale of similar works in other countries. Until recently, cheapness of construction, and accommodation for the present with completion in a hurry, have been the governing factors in design and

The Municipal Circle at Montreal

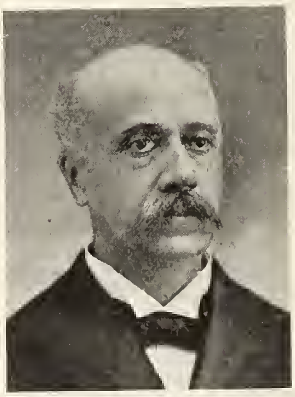
His Worship Mayor Lavallee.

Mr. Georges Janin
Chief Municipal Engineer.

Major Stuart Howard
Engineer in Charge of Sewers.

Mr. L. N. Dupuis, Controller.

Mr C. Godfrey, Controller.


Mr. D. Lachapelle, Controller.

Mr. J. Ainey, Controller.

Mr. J. R. Barlow
Engineer Superintendent, Road Dept.

Mr. Alcide Chausse
City Architect and Building Supt.

Mr. T. W. Lesage
Superintendent of Water Dept.

construction. The Harbor Commissioners have now given orders that for the future all works shall be designed having regard to permanence, symmetry and on a very much enlarged scale. Inter-communication between all parts of the harbor, even though not required immediately, is to be kept in view and necessary space and connections provided for.

One scheme of improvements has recently been completed, but another has been agreed on and is now in the course of execution, one great object being to double the capacity of the port. The expenditure involved is about $6,000,000, the works comprising additional elevator accommodation, a bridge, with railway tracks, to the south shore, the removal of the dangerous St. Mary's current, the complete changing of the entrance to the canal, and the construction of big twin locks. Three years will be taken for these improvements. For the present year the programme includes the erection of additional piers, sheds and wharves, the lengthening of piers, and the extension of harbor tracks, and dredging. The port possesses six grain elevators, three being of an old type. The great feature of this part of the port's equipment is the elevator belonging to the Commissioners and known as No. 2. This is constructed of concrete throughout. It is a structure 456 ft. long by 100 ft. wide, the receiving elevator being 314 ft. long and the extension 142 ft. The storage capacity of the working elevator is 1,772,000 bushels and of the storage addition 848,000, making a total of 2,620,000 bushels. Four railroad tracks extend through the entire length of the building, and there are 12 receiving lofter legs set in double hoppers, each having an elevating capacity of 12,000 bushels per hour. On a special jetty built on the slip opposite the elevator, a double marine tower for unloading vessels is erected. This is a steel structure with reinforced concrete floors and roofs. The Commissioners have decided to enlarge the No. 1 elevator, making the total storage capacity of the Commissioners' elevators 5,140,000 bushels.

A considerable amount of work has also been done in providing a site for a floating dock in the lower part of the river. This dock, constructed in England by Vickers, Ltd., is expected to materially help the port. All the harbor work, except buildings, is done departmentally, Mr. F. W. Cowie being the chief engineer. The harbor, as at present, including wharves, dredging plant, grain elevator and dock sheds, represents an expenditure of about seventeen million dollars.

Transportation Facilities

With the rapid addition to the population transportation problems have naturally arisen, and these are being gradually worked out. The Street Railway is mainly relied on to bring residents from the outside districts into the city, as the railway companies have not cultivated suburban traffic to any extent. Of course the companies have been obliged to augment their facilities, and the C.P.R. have added, as already stated, to the Windsor Station, and have also rebuilt the Place Viger Station and terminals. But it has been left to the C.N.R. to propose the boldest scheme for dealing with the suburban traffic—the construction of a tunnel through Mount Royal, with an electric railway from the harbor to a model city some five miles distant. This has been commenced, and will probably be finished within two years. The company also intends to erect a very large station and hotel in the city. The scheme has involved the purchase of an extensive area of property, and is likely to considerably modify the aspect of one part of the city. Hints have been thrown out that, at no distant date, the C. P. R. and Grand Trunk will follow the example of the C.N.R. and endeavor to obtain more suburban traffic by means of electric lines. A hitch between the council and the Grand Trunk has prevented the latter company carrying out, for the present, a plan for raising their tracks into the city, but this is bound to come. Another scheme from which much is expected is one by which Montreal will be connected by rail with Nottaway harbor on James Bay; while work is now proceeding on a line from Montreal to Ottawa. Two schemes for tunnels, with electric lines for passenger and freight traffic, under the St. Lawrence, are being reported on by order of the Federal Government.

Electric Power Developments

In a few years Montreal will be possessed of greatly improved facilities for purchasing electric power. There are several companies now in existence, but the tendency is for the bigger concerns to purchase those with limited capacities. The Shawinigan Water and Power Co., with its enormous plant, supplies a very large amount of energy, and is allied with the Light, Heat and Power Company; while the Canadian Light & Power Co., which draws its power from St. Timothy, is linked up with Street Railway interests. Operations have just been commenced on what promises to be an exceptionally important scheme that of the Cedar Rapids Company, which is controlled by the Shawinigan and Light, Heat and Power capitalists. It is proposed to ultimately develop 160,000 horse power.

In connection with the power situation, the council have appointed a commission of electrical experts who are drawing up plans for underground conduits in which all wires will have to be laid. The idea is to first of all deal with the main thoroughfares and then with the side streets. It is a work of several years' duration, as the streets are a network of gas, water and other pipes.

Montreal's City Engineer

Mr. Georges Janin, general municipal engineer for the city of Montreal, was born at Poicters, France, in 1853, and came to Canada in 1892. One of his earliest interests in this country was the protection of running waters from sewage pollution. In his official reports he emphasized the necessity for introducing the system followed in Europe and the United States. Mr. Janin outlined his views on this subject at a conference held in Montreal in 1896, and received the support of the Provincial Board of Health. The St. Laurent College subsequently authorized Mr. Janin to undertake a sewage farm scheme, and after his first experiment the city of Montreal entrusted him with a similar enterprise to utilize the sewage of St. Denis Ward.

In 1898 Mr. Janin entered the service of the city as acting superintendent of the aqueduct system, during the illness of the superintendent at that time. He was afterwards appointed assistant superintendent, finally assuming the direction of the Water Department. The Provincial Board of Health also appointed him consulting engineer.

Mr. Janin has been closely identified with practically all the important works carried out in Montreal in recent years. Of these perhaps the extension of the waterworks is the most noteworthy

Preventing Law Suits on Construction Work

A Discussion of the Methods of Procedure in Avoiding Difficulties and Legal Tangles, and of the Economy Involved

When a contractor secures a new contract and begins work, everything has a rosy appearance. If he has never done work before for the owner or corporation, he finds everyone pleasant, and polite, and the engineer or architect seemingly treats him with great consideration. It is at this stage, when all concerned are friends, that may be the beginning of trouble that afterwards results in law suits.

Thus, a contractor should begin to fortify his position before he signs the contract for a job. Every section and clause of the contract and specifications should be read over carefully before signing any papers. If all is not plain or if any doubt arises as to any part of the contract in the mind of the contractor, he should not sign it until he has consulted his attorney.

Any contractor doing much business should always have a competent lawyer. Those who have but a limited business should, as occasion demands it, obtain the services of an attorney. Most contracts should be shown to an attorney before being signed. Not that they might recommend any changes in it, although this may be done to the evident advantage of the contractor, but in order to have any doubtful points explained to the contractor and so that the attorney will know from the start the conditions under which the contract was signed and be generally familiar with the provisions of the document, so that if any trouble or dissensions occur afterwards, the attorney will be in a better position to advise his client.

Value of Diary

The contract once signed or the work commenced, a diary should be kept of each day's happenings on the job. If a contractor has his own office on the work, one diary may be all that is needed, but otherwise a diary should be kept at the contractor's office and also one at each office or camp on the work.

For this purpose one or more men should be detailed to make entries in the diaries. One entry should be made each day, and it is always advisable for two or even three men to make entries in the same diaries, as then the same incident or conversation is recorded from more than one viewpoint and the record will be more complete and valuable. This is especially so of a conversation, as the various witnesses have written down immediately after hearing it the important part of all that was said.

Progress reports and daily reports of work done should not be recorded in the diaries, as such records can always be obtained from the cost keeping and time reports. Each day a record of the weather should be made and if concrete work is being done in the winter time, the temperature should be recorded at least four times a day, at the time to start work, when the temperature becomes such as to allow concreting to be done, when this work must be stopped on account of cold, and at the close of the work day. Any unusual storms should be set down and when accidents happen a full account should be put in the diary.

The comings and going of the contractor, the owner's engineers or architects and other officials should all be recorded. Likewise, the receipt of important communications and plans, and anything that may affect the time clause in the contract. Diaries in which such information is recorded will possess great value in the future, and will sometime prevent lawsuits, for few engineers keep such records. In case of a lawsuit, they will be a wonderful assistance to the contractor's attorney, while the lawyer on the other side, after the diaries are sprung on him, will more than likely detest the mere mention of the word "diary," as he will find it hard to counteract the effect of them on the court and jury.

As soon as plans for any part of the work, or written instructions are received, they should be marked "Received," with the date upon them. For this purpose a rubber stamp with red ink should be used, as it can be plainly seen on a blue print and over black ink. The same stamp can also be used on letters, as such a thing is needed if a contractor has several different jobs. He is a busy man and is kept travelling from place to place. Walking into one of his offices, he picks up a letter, sees the date on it upon which it was written, and then sees by the rubber stamp mark the date of receipt and below it another stamp giving the date of answering. Thus, he knows at a glance whether or not his business is given prompt attention, and without asking questions he has the entire sequence of events presented to him. Where a large volume of business is being done, it may even be advisable to have a time stamp showing the hour of the day when the various things were done in regards to the receipt and dispatch of letters and papers.

If possible, the original plans and prints received should not be used on the work. After these are stamped and dated, they should be filed for future reference. If plans are changed, then the new copies should be stamped and dated and filed. Thus a complete record of the plans and the changes made in them can be had for quick reference. When many changes are made and the contractor is delayed by the owner or his engineer or architect, then such a record will prove invaluable. These alone may mean the prevention of a lawsuit.

In case the contractor furnishes a bond, it is good practice to notify the bonding company of many of these things, then should trouble occur in connection with the bond, the bonding company is cognizant and they and the contractor can work together with a clear understanding.

The contractor should always have on each job a competent man who can be given instructions by the owner, his engineer or architect or his agent. There should also be a second man appointed for this, so that he can be present on the job in case of absence of the regular man. The engineer or architect should be advised by letter at the commencement of the job as to who these men are and if changes are made,

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By Daniel J. Hauer in The Contractor.

notification should be given. At the same time the engineer or architect should be requested in a nice manner to give verbal instructions to these men only and not to foremen, subforemen and even workmen. Many engineers give instructions to anyone in the contractor's employ and often cause trouble for themselves as well as the contractors. Some engineers do not realize that most foremen and workmen in the employ of a contractor are not responsible and care little for the instructions of either the engineer or the contractor. Then, too, many of them are not intelligent enough to receive and repeat verbal messages correctly, and often the act of giving such men instructions causes insubordination. The only proper method, in order to maintain an organization and discipline, is to give instructions through the proper channels, as is done in an army or other large organization.

In starting any job, all of these things and many more should be given attention. Once started in the proper manner, it is comparatively easy to carry them along without trouble, but if good feeling and friendly relations are depended upon to carry things through, then the friendly relations are likely to cease and only trouble will result. For this reason a set of rules covering the things to be done should be formulated and followed, and with this as a nucleus, a set of rules and regulations can gradually be gathered together and printed that will be found to be invaluable in carrying on a number of jobs at the same time.

Employees' Rules

It is rather an easy task for an able man who is always present on his job to look after the many details and to decide upon all questions as they arise, but let this same man have three or four different jobs in several states, then he is compelled to rely upon others, and few subordinates will attend to business as well as their employers. Thus it becomes necessary to have rules and regulations for the guidance of the employees, not only that they may keep their records and do their work in a uniform manner, but that they shall act in cases of emergency not in the manner that they may think best, but in a manner that is satisfactory to their employer, which should be based upon the experience of the contractor and that of his entire organization. It is only by such a method that a contractor can hope to prevent himself from being brought into trouble that may result in lawsuits. To give the rules to employees by word of mouth means that many of them will be forgotten just at the time they are needed the most, while if such rules are written or printed, it will always be convenient to refer to them.

Lawyers cost money, for, as a class of professional men, they are well paid, but their advice at times may be worth many times the money paid them in fees. Thus, if trouble of any kind occurs, it is poor economy to wait until a lawsuit is the only recourse before engaging an attorney. Some years ago the writer was engaged on some construction over which a number of disputes arose. The contractor as soon as the first dispute occurred engaged an able lawyer to advise him, and acting on the attorney's advice the work was so handled and the relations with the owners were so conducted that the latter were willing to arbitrate the various matters under dispute rather than stand a lawsuit that would have tied up their work and which they in the end would have lost. The arbitrator awarded to the contractor nearly everything he claimed and made the contract a very profitable one. This was due entirely to the able manner in which the attorney handled the contractor's business for him, and prevented a lawsuit, in which the contractor may have had thousands of dollars tied up for some years.

Recently the writer was engaged in a lawsuit that showed to a marked degree the manner in which a competent attorney, skilled in law and possessing general knowledge of construction work, handled the legal side of a contract so that in the end the contracting company won an important lawsuit. To one who has had experience in these matters, the hand of the attorney was to be seen at every move that had been made.

The contract, a large one, was let on competitive bids, several contractors making proposals. The work was let at low prices, and immediately upon starting the work, disputes occurred between the contractor and the company, due to drastic changes being made in the plans. At once the attorney who had approved the contract before being signed, was brought into the case. He decided upon the letters that were written and every important thing that was done. As the work progressed, it was found that money could not be made, due to some difficult local conditions and to changes made in the plans. Then the attorney instructed the contractor how to act so that the owners refused to let the contractor proceed. Finally, the owners refused to pay the contractor. Acting on advice of the attorney, the contractor continued work with a small force, in spite of these things, when the owners forcibly ejected the contractor and his men. Every step taken by the contractor was strictly according to law and protest was made in writing against every act of the owners and the engineers. Immediately the contractor entered suit, claiming a breach of the contract and prospective profits on the entire job before the changes were made. For nine years this case was in the state courts. Twice it went to the supreme court of the state and each time the courts decided that there was a breach of contract on the part of the owners, and awarded the contractor substantial profits on the job. These cases stand out as striking examples of what attorneys can do for contractors.

Expert Services

Another important consideration in such matters is the services of an expert engineer. Few attorneys are conversant with construction work, the method of procedure, the recognized customs and the many technical terms. These an engineer must explain to him. Then, too, the engineer and the contractor can go over the work together and discover many things that even the attorney with his trained mind would miss. The engineer, like the attorney, will be familiar with the job during its duration and his advice will be of material assistance to the attorney. Then, too, the engineer will make written report of everything he discovers connected with the work, and these the attorney will use, passing on the legal aspect of each point made. This is of vast assistance and frequently the engineer's work may mean many thousands of dollars made for his employer. The writer has known of suits being settled, due to reports made by engineers on disputes between contractors and owners. Of course, an engineer can be brought in afterwards and be of considerable help, but to obtain the greatest value from his services, he should, like the attorney, be employed at an early stage so as to be cognizant of all events as they happen, and in some cases he should be able to see the work done and the sur rounding conditions at the time. This alone may mean the difference of many thousands of dollars. On some jobs the time limit is an essential feature of the agreement and thus the progress of the work is watched very closely by the engineer or architect. The contractor should be just as alert and protect himself in every way possible. Then weather conditions, holidays and everything else that might cause delays should be recorded. On river work water gaging should always be done. Acts of God, such as storms and floods that delay and shut down work, seldom count in time limits, as working day must be other than Sundays and holidays, upon which ordinary work can be done. However, many contractors and engineers have the erroneous idea that damage done and extra costs added to work by acts of God make it incumbent upon the owners to pay such extra expense. They are not, as the law holds that no one is responsible for extraordinary weather conditions and severe storms. Inasmuch as the contractor, according to his agreement, must deliver to the owner a completed structure, he must stand this extra expense. But he is entitled to extra time due to these causes.

Time Limit

Another important matter regarding time limits is the receipt of plans and stakes for doing the work, and various instructions regarding carrying on the job. Records should be made of the receipts of these things and when permission and stakes are given for the work, this should be noted, for a time limit cannot be lived up to if the work is not ready to be done. Changes in plans also affect the time limit. Minor changes of details should seldom make any difference to a contractor, but drastic and decided changes may cause extra allowance of time, while there may be occasion when it would be possible to shorten the time limit. This, though, must be done by mutual consent of the two parties.

If the contract time expires before the work has been completed, and there have been delays in receiving plans and stakes for the work, the contractor should, at the expiration of the time limit, write the owner or his agent a letter setting forth these various delays and state that he is willing to give up the work provided he is paid for all work done to date, for all materials furnished and not used, and that his retained per cent. be paid over to him. The chances are the owner will never answer the letter, so that his silence will give consent to indefinitely prolonging the time for completion. If he should allow the contractor to proceed and so give his consent in writing, the contractor is even on a better footing. Such a letter is bound to bring on a crisis and under no circumstance can the contractor be injured while the likelihood is that he will be much benefited. Such matters, though, must be handled with care, and it is the part of wisdom to consult an attorney.

Finally, the best way to prevent lawsuits is to be prepared to meet all emergencies. Then a contractor's position will be so strong that most people will be afraid to go to law with him. It is the same principle that the great nations of the world have to maintain such a navy and army and to keep them up to such great efficiency that other nations are afraid to go to war with them.

Lawsuits are slow and tedious and very expensive, so they should be avoided. One prominent contractor who has operated all over the world is proud of his record that he has never brought a lawsuit against an owner.

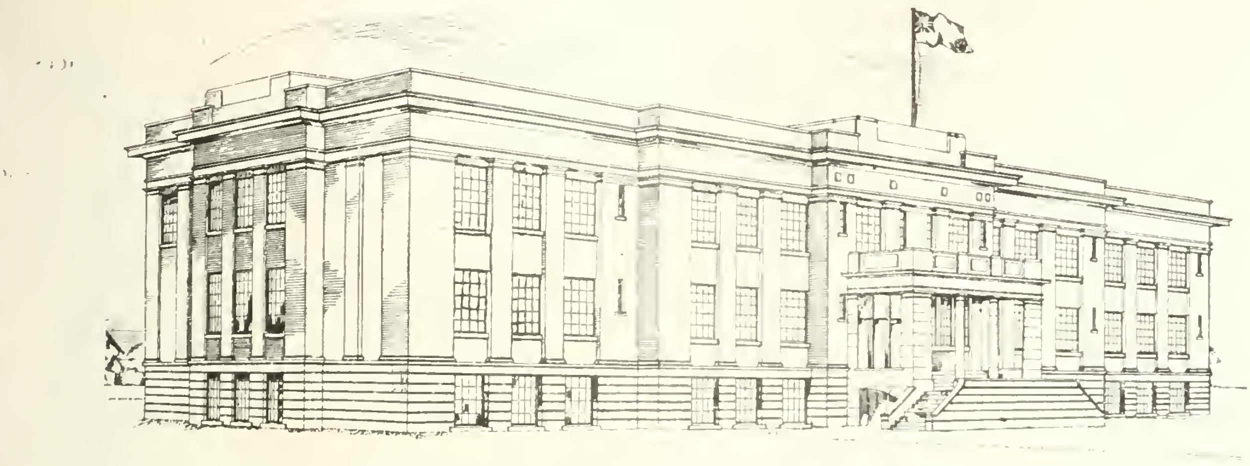
Royal Trust Building, Montreal

ONE of the most important buildings now in course of construction in Montreal is for the Royal Trust, on the site of their old offices on the corner of St. James street and Place d'Armes. It is designed by McKim, Mead & White, of New York, the general contractors being the Norcross Brothers Company. The area is 90 x 100, and the building will consist of nine storeys above St. James street and ten above Fortification Lane, in addition to which there are to be three basements. The frame will be of steel (supplied by the Structural Steel Company, Montreal), with an exterior of Stanstead granite, backed with brick work, the granite being prepared at the contractors' works, Iberville, P.Q. The foundation is of concrete. The building will be exceptionally well lighted, a light court being situated in the centre. This will be finished in enamelled brick and kalamined work. The several floors will be of terra cotta. Four passenger, one freight, and a book elevator are to be installed.

In the sub-basement provision is made for vaults and machinery, in the basement for filing and other vaults, machinery, etc., and in the basement mezzanine, security vaults, toilet rooms, mailing clerks. A vacuum cleaning plant is also to be installed, this operating four sets of standard tools for cleaning rugs, carpets, furniture, etc., and the dust being conveyed to the basement. A pumping plant is to be installed, together with motors for the ventilating system. The lighting will be by electricity. Steam heating will be provided, the steam being obtained from the Montreal Light, Heat and Power Company.

Head Office Building of the Royal Trust Company

The feature of the ground floor will be the large public hall, entrance hall and vestibule. Marble is to be chiefly employed in the construction of this portion of the building; Belgian black marble and pink Knoxville marble will be used for floors and wainscoting, and Botticino marble for walls and columns. Bronze grills will separate the clerks from the public. The principal officers of the company will have rooms on this floor, these rooms, together with the president's



The Connaught School, Regina. Architect, Mr. J. H. Puntin; contractors, Parsons Building Company, Limited

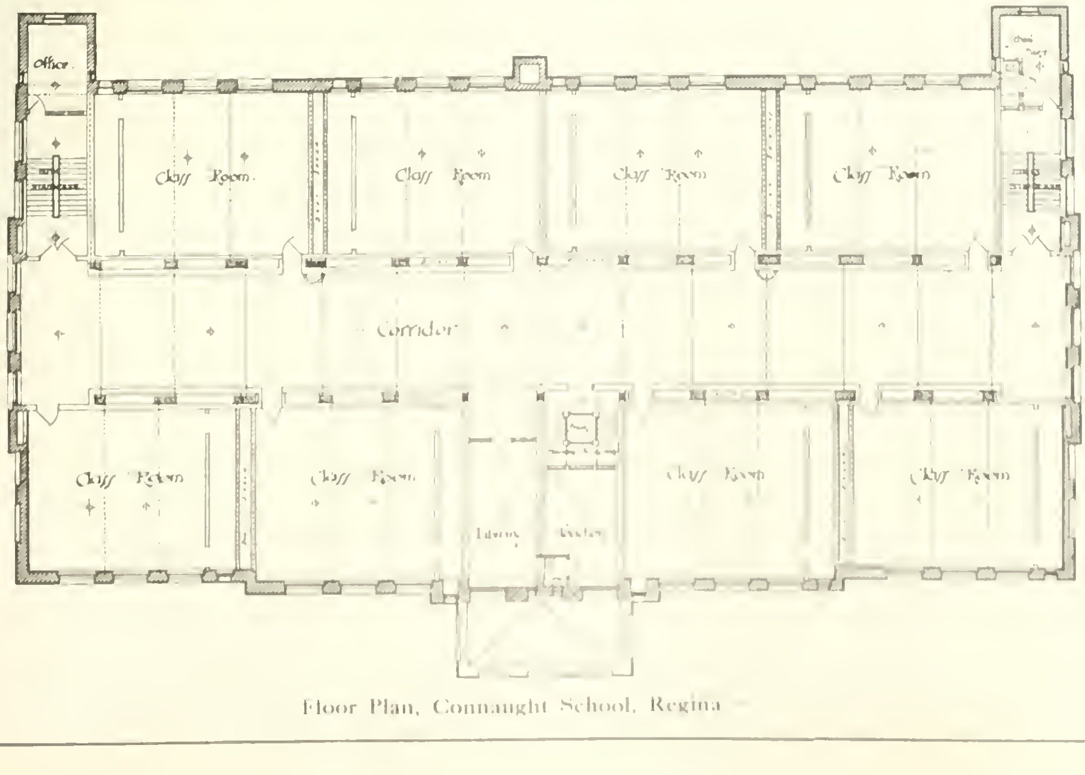
room on the next floor, being finished in Italian walnut, while other offices throughout the building will be finished in white oak. Behind the counter the floor will be of cork tile. On the same level there are to be rooms for the working staff.

The Royal Trust will also occupy the first floor, which will contain the auditor's room, a large lunch room, and securities department. The other floors are to be let for offices for various firms, there being accommodation for storage on the fourth floor and vaults on the sixth and seventh floors. On the roof there is to be a tank for storing water.

The Calgary Clay, Coal and Coke Company, Limited, has been incorporated with a capital of $2,800,000 to deal in bricks, clay and other building materials. The head office will be at Calgary.

The Connaught School, Regina

THE accompanying illustrations show a perspective view and floor plan of the new Connaught School, Regina, now under construction and for which plans were prepared by Mr. J. H. Puntin, architect, of Regina. The building is situated on the corner of the 13th avenue and Elphinstone street. At the time of writing, our information is that the corner-stone of the building is to be laid by H.R.H. the Duke of Connaught, upon the occasion of his approaching visit to the city. The building embodies the most approved principles of school design. The columns and floor slabs are reinforced and the exterior is of Bedford stone and Menominee red brick. The building is equipped with an elaborate ventilating system and all modern improvements. The contractors are the Parsons Building Company, Limited, Regina, Sask.



Floor Plan, Connaught School, Regina

The Railroad Activity of 1912

THE year 1912 has been a particularly active one in the railway construction field, few people realizing the extent of the work being done by the three great transcontinental railways. In the western provinces, perhaps, the railroad companies have exhibited the most marked activity, which is only natural when one considers the vast country to be opened up there and the increasing demand for better transportation facilities. Yet throughout the whole of Canada, east and west, railroad construction has established a record this year, surpassing by far any previous development.

An idea of the magnitude of this work may be obtained from plans recently approved by the Board of Railway Commissioners. The Canadian Pacific Railway have the approval of the commissioners for the following branch lines and extensions: Boissevain to Lauder, 35.29 miles; Estevan to Forward, Sask., 55 miles; Hawarden to Floral, Sask., 46.8 miles; Asquith to Conquest, Sask., 35 miles; Swift Current, westerly, an extension of the Swift Current southeasterly line from Neville to Vanguard, Sask., mileage 27.5 to 43.6, also the extension of the Swift Current to Brooks branch to Bassano, Alta. This latter line is opened for traffic as far as Cabri and is under contract for eighty miles further. It is said that the final surveys for the remaining mileage have been completed. The C. P. R. also have under construction a line extending for 55 miles in a south-westerly direction from Suffield, Alta.

The Canadian Northern Railway have plans approved for a line through townships 22-19, range 29.28 west of the fourth meridian, mileage 13.21 to 31.40, and through townships 19-15, range 29.26 west of the fourth meridian, mileage 31.40 to 65.05. This company have also let the contract for their Calgary-MacLeod branch to the Northern Construction Company and have prepared plans for a station site and track lay-out at Calgary. Grading on the C. N. R. line from Edmonton to the British Columbia boundary has been completed to Hinton, a distance of 175 miles, the track being laid as far as Entwistle, and work is in progress on the remaining portion of the route which is expected will be completed by May, 1913. The Canadian Northern have also under construction a line to St. Paul de Metis, and a branch line out of Edmonton from Onoway in the direction of Peace River.

The Grand Trunk Pacific have extensive work in hand and expect to complete by December 1st a line from Regina to the international boundary near Portal, Sask., where connection will be made with a line now being built by the Great Northern from Niobe, N.D. This will give the G. T. P., by using the Great Northern lines, connection with Chicago where the Grand Trunk will take over the traffic. The Board of Railway Commissioners have approved of the location plans prepared by this company from mileage 12.71 to 21.86 of the branch line from Harte to Brandon, also a line from Regina to Moose Jaw, between mileage 40.01 and 47.74. A further section of the G. T. P. branch from Young to Prince Albert has recently been opened for traffic and the remaining 75 miles are now under construction.

From the above brief summary of the railway construction in progress or contemplated in Western Canada it would seem that the possibilities of that country were unlimited in the minds of the railroad companies and that the prairies were about to receive that assistance from the railroads so necessary to their future development.

Frazil and anchor ice and the conditions under which they form and cause trouble in water works and power plants were discussed in a paper recently read by Mr. L. C. Trow before the Illinois Water Supply Association. Ice was classed under three heads, namely: sheet ice, formed upon the surface; anchor ice, formed on the bottom; and frazil, formed below the surface and above the bottom. "Anchor ice as well as frazil will be formed," Mr. Trow said, "only where there is a cloudy sky at night, and the accumulation ceases at sunrise. The very slightest rise in water temperature relieves the situation and the ice will loosen its grip if the water is warmed the thousandth part of a degree on the positive side of freezing. Anchor ice is formed upon the bottom of rivers or bodies of water where the water is in motion, while the growth of frazil is in the water itself and the necessity of some object being present for it to attach itself to is eliminated as the floating particles will adhere to one another. The growth of frazil must be accomplished by surface cooling through wind or rapid agitation and by radiation." Referring to experiences in the remedying of ice troubles, Mr. Trow said: "At times we have been able to maintain a (water) pressure of 75 lb. upon the intake for 15 to 20 minutes before there would be any notable release. About once in five times, when tried before sunrise, this method has proved satisfactory, the other four times more water was lost in back-flushing than came back before the ice again closed the opening."

A covered concrete reservoir at the State Hospital at Yankton, S. D., presents the unusual feature of having its roof slab serve as the floor of a two-storey concrete building. The tank is rectangular in section, 185 x 45 ft. in area, and is 11 ft. deep. Two lines of concrete columns divide the structure into bays with transverse spans of 15 ft. and longitudinal spans of 7 ft. 6 in. The walls were cast solid in 30 ft. sections, alternate sections being poured. Water-tight joints were secured in these walls by casting a copper strip 12 ft. long and 9 in. wide in the wall sections in such a position as to avoid stressing it in the event of the concrete contracting. The floor was cast in slabs 7 ft. 6 in. square, and 1 x 4 in. white pine strips painted with asphalt after thorough drying were placed between them. It is expected that the strips will swell, thereby making a water-tight joint. It was stated that the asphalt coating was applied to prevent a too rapid swelling.

An ice rink completed at Edinburgh, Scotland, has an ice surface of 17,000 sq. ft., the building being 220 ft. long, 120 ft. wide and 38 ft. high. The floor is entirely free from pillars. The freezing machinery consists of ammonia compressors with brine circulation through continuous lines of steel tubes, of which there are about 9 miles. The brine is circulated at a temperature of 20 to 22 deg. Fahr., and the ice on the floor is from 1 to 6 in. in thickness. The ammonia compressors are operated by a Diesel engine of 100 h.p., through a 9-rope drive.

Canadian Railroad Development

The plans for the new Union Station at North Toronto are all well prepared and are now in the hands of the chief engineer of the Canadian Northern Railway.

Sir Donald Mann, vice-president of the Canadian Northern Railway, recently stated that if freight rates were reduced it would seriously affect the credit of Canadian railroads and might also retard construction.

It is thought that the Western Dominion Railway Company, which has been recently incorporated at Ottawa with a capital of $5,000,000 for the purpose of constructing railways in Alberta and British Columbia, is a Hill project, and that the company has been formed as an extension of the Hill system.

Active operations have commenced on the construction of the forty-mile section of the Canadian Northern Pacific island line which lies between the north end of Cowichan lake and the Alberni Canal. This work involves an expenditure of one and a half million dollars. The grade is to be completed within a year.

The action by Messrs. O'Brien and Doheny, contractors, to recover $850,000 from the Quebec and Saguenay Railway Co. is proceeding. Meanwhile the contractors have petitioned the Lieutenant-Governor-in-Council to place the line in liquidation, in order to protect the estate against creditors who might obtain priority in payment.

Work has been commenced on the reconstruction to standard gauge of the Kaslo and Slocan railway, between Bear Lake and Whitewater. A first-class grade will be used no curves to exceed 10 degrees. Eighty-pound rails will be used. The estimated cost is $300,000 to $350,000. Mr. W. P. Tierney, of Vancouver, is in charge of the work.

W. F. Tye, C.E., of Toronto, has been appointed by the Government to investigate work done in the construction of the National Transcontinental Railway under the old commission. An investigation has been in progress for some months by Mr. George Lynch Staunton, K.C., of Hamilton, and Mr. F. P. Gutelius, a practical railway man, formerly with the Canadian Pacific Railway. It is understood that Mr. Tye's work will be carried on in connection with this investigation, the results of which promise to be of a somewhat startling nature.

Chairman A. W. Smithers of the Grand Trunk Railway recently urged the relaxation of the present Canadian immigration regulations in order to allow more labor for the construction of new railroads in the west. Mr. Smithers said that the lack of laborers was paralyzing construction and other enterprises were suffering also. It was quite evident, he declared, when men working on construction and getting three dollars and more for an ordinary day's labor, struck for more pay, that the time was approaching when the railways would have to suspend construction until workers were more reasonable.

A meeting of the citizens of Midland, Ont., was recently held at that place to consider the construction of the Central Canada Railway from Midland to Montreal. The company have had a charter for some years and are entitled to a very large land grant under a charter granted before confederation. The company have recently floated their bonds in England and have let a contract to a large English contracting corporation for the construction of the railway. The first section from Montreal to Ottawa is in course of construction, and steel is laid for a considerable distance. It is proposed next spring to start construction on the other section from Montreal westerly and from Midland eastward. Running rights will be given to the Intercolonial Railway over this line.

The Pacific & Great Eastern Railroad has preliminary surveys under way for the construction of a new line into North Vancouver. According to the route proposed the line will run from the headwaters of the Manquam River across country in a northwesterly direction to Daisy Lake, a point near Cheakamus River and about 20 miles from Newport, Wash. It is reported that the present line located between North Vancouver and Newport will probably be abandoned owing to the fact that the company is experiencing great difficulty in securing a right-of-way through West Vancouver as well as not being able to acquire a portion of the completed line of the Howe Sound and Northern Railway.

"The plans now accepted for the new Union Station and viaduct at Toronto, will prove to be one of the greatest death traps on the continent," said Vice-President McNicoll, of the Canadian Pacific Railway, in an interview recently, "and it is that that has forced us to protest against it by making an appeal. The trouble lies in the fact that there will not only be overhead tracks, but that there will also be level right-of-ways, which will mean that there will be level crossings in a greater number than at present in the city. The Canadian Pacific does not mind spending money, and it is not a question of expenditure that has resulted in the appeal. It is only that the company desires to have the best possible plan accepted before any action is taken."

A strong educational campaign in the interests of good roads has been launched and a forward step taken in connection with the project of a concrete road from Toronto to Hamilton. The Toronto-Hamilton road was the subject discussed by a large deputation which waited on Sir James Whitney and Hon. Dr. Reaume, Minister of Public Works, at Toronto, recently. The deputation included representtives of the Toronto and Hamilton city councils and Boards of Trade, members of the councils of the municipalities between Toronto and Hamilton, members of the Toronto and Hamilton Roadway Association, and representatives of the Ontario Motor League. The object of the deputation was to interest the government in the project, but no definite proposal as to what the government should contribute was submitted. The scheme would provide for a paved road from the city limits at Toronto to the city limits at Hamilton, entering Hamilton by passing around the bay and over the high level bridge. This would make thirty-five miles of road to be constructed, and would involve an expenditure of between five and six hundred thousand dollars.

St. John, N.B., is in the midst of a great industrial boom. A year ago there was no real estate movement in St. John worthy of the name. A few weeks ago two properties in the city which were bought eight months ago for $105,000 were resold for about $150,000. To explain the change that has come about in less than a year it is necessary to point out that it is now definitely settled that St. John will be the Atlantic terminus of the Grand Trunk Pacific Railway, and it is equally certain that the Canadian Northern will eventually bring trade to the port, making three trans-continental railways having terminals at St. John. Within a few weeks the biggest dredging plant ever assembled at a Canadian port will be at work in the eastern and western harbors of St. John, for besides the five dredges and stone lifter that have been working in the western harbor and channel the Norton Griffiths Dredging Company are assembling a fleet to dig in Courtenay Bay. So much building and construction work has been going on in the city during the past summer that it has been difficult to secure sufficient labor.

The Great Building Record of the Coast

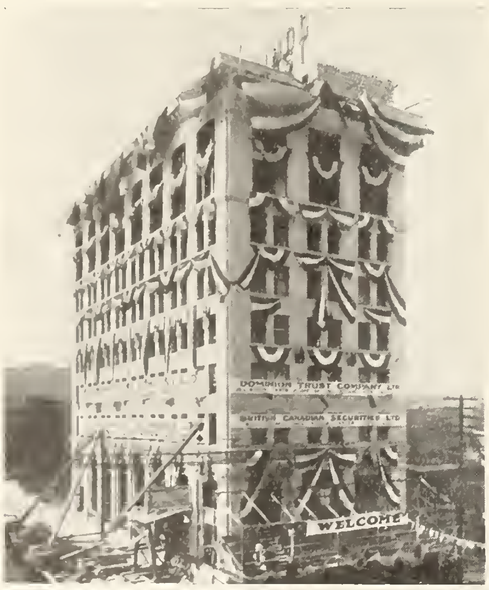
1912 a Year of Unprecedented Activity at Vancouver and Victoria—Constructional Features of the More Important Work

(Correspondence of The Contract Record)

Vancouver, Oct. 16, 1912.

WITH the passing of the summer months a number of splendid buildings have been completed at Vancouver. The list of new structures includes store and office buildings, apartment blocks, warehouses, hotels, schools and churches, etc. Prominent amongst the newer buildings are the Vancouver and Rogers Blocks. The former, with thirteen storeys and tower, is the highest building in the city, with the possible exception of the World Building. The Rogers Building, now almost completed, is ten storeys in height and is one of the most attractive structures in the city.

The British Canadian Securities, Ltd., and the Dominion Trust Company are jointly erecting an eight-storey office building at the corner of Pender and Homer streets to cost $300,000. This building is rapidly approaching completion and will be ready for occupancy within the next few weeks. The measurements are 52 x 120 feet. Steel frame and reinforced concrete were used in the construction, upwards of 500 tons of reinforcing steel being employed. Up to the first storey the exterior is of Bedford Indiana stone, and above that, pressed brick, with terra cotta window sills, cornice, etc., the ornamental terra cotta work to match the Bedford stone. The banking room on the first floor will be finished in Italian marble. All floors will be of terrazzo marble and the corridors will be lined with marble and quartered oak. The illustration shows the building handsomely decorated in honor of H. R. H. the Duke of Connaught, upon the occasion of his recent visit to Vancouver. Mr. H. S. Griffith, of Vancouver and Victoria, is the architect, and the Norton-Griffiths Steel Construction Company have charge of the construction work.



Building corner of Pender and Homer Streets, Vancouver, erected conjointly by the B. C. Securities, Limited, and Dominion Trust Company

Prominent among the number of office buildings under construction at Vancouver is the Birks Block, now being erected at the corner of Granville and Georgia streets. The accompanying cut shows work well advanced on the superstructure of reinforced concrete and steel frame. The building will be a ten-storey fireproof structure, with a frontage of 100 feet on Granville street, and a depth of 120 feet. It will cost in the neighborhood of $450,000, and will be one of the best equipped buildings of this class on the Pacific coast. Constructional operations are being carried on by the Norton-Griffiths Company.

The construction of school buildings at Vancouver has contributed materially to building activity. The new addition to the King Edward High School is an excellent example of the type of building designed by Mr. N. A. Leech to meet the requirements of the Vancouver School Board. The size of the structure shown is 219 feet by 116 feet. It is being built of reinforced concrete, faced with stone in keeping with the older portion of the building, and is almost completed. The Norton-Griffiths Steel Construction Company have charge of the contract. The cost is estimated at approximately $125,000.

Work has commenced on two fine theatre buildings, the new opera house on Granville street, and a structure now being erected for Marriot Fellowes, on Pender street at a cost of approximately $250,000. It is quite probable that both of these buildings will be finished before the end of the present season. One of the biggest theatrical syndicates in America, Messrs. Klaw & Erlanger, have decided to build a high-class theatre in Vancouver. The site chosen is on Nelson street, between Granville and Seymour streets, the land being already purchased. It is stated that this structure will cost in the neighborhood of $225,000, and will be completed by next May.

Two other large theatres, the Hippodrome, and Mr Alex. Pantages' ten-storey theatre and office building, are contemplated for early erection, but work has not yet commenced.

Work is advancing rapidly on the Dominion Government new customs examining warehouse on Cordova street, just opposite the C. P. R. depot. Five of the six storeys are now completed, and the building will be finished before the contract time, January 1, 1913. The building is of steel construction, with concrete floors. Up to the third storey the exterior is of granite, above which red pressed brick trimmed with sandstone is used. The dimensions are 120 feet by 120 feet, and the cost is estimated at $400,000. Mr. Wm. Henderson, of Victoria, prepared the plans, and Messrs. J. G. McDiarmid have the general contract.

Vancouver will soon possess a splendidly equipped Y. M.C.A. building. The structure will be situated on Georgia street, near Burrard, and will be of reinforced concrete construction, with brick, stone and terra cotta exterior. The height will be eight storeys, and the cost, complete, about $350,000. Tenders are about to be called for a general contract, and construction will be well under way before the end of the present year.

Building construction in the Fairview district of Vancouver forges ahead rapidly. The apartment house to be erected for Mr. E. Cook at the corner of Granville street and 12th avenue, will be one of the finest buildings of its

The addition to the King Edward High School at Vancouver

kind in this section of the city. The new structure will have a ground floor space measuring 54 x 120 feet, and will be six storeys in height. It is of steel and concrete construction and will cost approximately $200,000. The Granville street and 12th avenue elevation will be faced with terra cotta. The building has been designed with balconies on each floor and a wide promenade around three sides of the sixth floor. Interior arrangements are entirely modern. Construction work is to commence immediately. The Cook Construction Company have the contract.

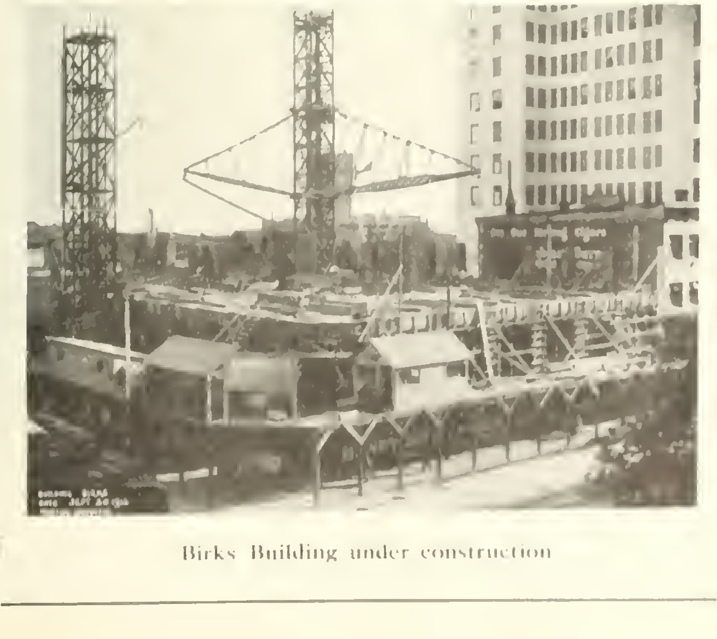
Balmoral Hotel building on Hastings street east, near the intersection of Main street, has recently been completed. The building is of steel construction and is faced in buff colored pressed brick. It is built to a height of eight storeys and measures 50 x 120 feet. The Webster Modulating system of steam heating has been installed. The cost is approximately $100,000. Messrs. Parr, Mackenzie & Day were the architects and Messrs. J. J Dissette & Company, Ltd., the general contractors.

Work was commenced recently on the construction of a new garage to be erected by the Tudhope Motor Car Company, at the corner of 15th avenue and Granville street. The structure will cover a ground space of 75 x 125 feet, and will be two storeys in height. It will be of reinforced concrete construction, fireproof throughout. In addition to offices and showrooms, there will also be a well equipped machine shop in connection with the garage, and provision for the handling and storage of about 200 cars. A five-ton freight elevator for the carrying of cars from one floor to another will be installed. The estimated cost of the entire structure is placed at $50,000.

Another new garage is at present in course of construction on Georgia street between Bute. The Archibald Auto Company are the owners. This will also be a reinforced concrete building, three storeys in height, and fireproof. Accommodation is made for 125 cars. There will be a large salesroom, paint, carpenter and machine shops, equipped with the latest mechanical devices. The building represents an outlay of $30,000.

Excavations have been made and construction will be started at an early date on the new eight-storey addition to the Empress Hotel on Hastings street east. This addition will measure 25 x 122 feet, and will be of reinforced concrete construction. It will be faced with pressed brick brought to the city especially for this work from Coffeyville, Kansas. Mr F. N. Bender prepared the plans.

The Canadian Pacific Railway are at present contemplating the addition of two hundred rooms to the Empress



Birks Building under construction

Hudson's Bay Company's stores, Vancouver

Hotel at Victoria. This, besides involving work for the installation of foundations which were not contemplated when the original structure was planned, may lead to the creation of an eastern facade in replica of the present one with its western outlook.

When constructed originally the Empress Hotel provided approximately one hundred and seventy rooms. Hardly had this accommodation been made available, however, when it became apparent that more accommodation would be necessary, and the northern wing was undertaken, with sixty-two additional rooms. So great was the patronage that another wing was ordered, and following this policy, the latest addition, the eastern wing, with eighty-two rooms, was hurried to completion. The total number of rooms at the Empress at the present moment is thus approximately three hundred and twenty. Estimating furnishings and general equipment, the expenditure of the C. P. R. up to the present moment in this famous hostelry is between two and three million dollars.

Judging from the recent announcement made by Sir Thomas Skinner, the Hudson's Bay Company director, an immense new store building involving an expenditure of $1,000,000 will be erected by the company in Victoria. This structure will be similar in design to the proposed store at Vancouver, and will be erected when the latter building is completed.

There is now in course of construction at Victoria an excellent type of small theatre, the design being in French Renaissance. The superstructure is to be of steel carrying brick walls and reinforced concrete floor slabs, and interior partitions. The balcony and gallery will be of cantilever construction, and there will not be a single column in the theatre to obstruct the view from any portion of the house.

In the basement beneath the apartments there will be a first-class restaurant, and under the approaches to the theatre provision has been made for a billiard room. Heating and ventilation will be along the most approved lines, fresh air being brought from a point over the roof through tempering coils, which will heat the air and force it into the auditorium by an electric fan. The same system will be employed for cooling in the summer months. Messrs. D'Oyly, Rochfort and E. W. Sankey are associated architects and the building will cost approximately $150,000.

The gates of one chamber of the St. Gabriel lock in the Lachine Canal at Montreal were wrecked recently by a boat collision that resulted in draining the adjacent upper level of the canal and caused a total interruption of navigation. The two chambers of the lock are side by side just below the Rue des Seigneurs swing bridge. Below them the basin is crossed by the Wellington Street swing bridge. The steamer "Glenmount" had just passed through the lock and the upper swing bridge, leaving the upper gates still open, when the steamer "Nevada," also up-bound, run into the lower gates and tore them from their hinges, allowing the water from the upper level to escape in a wave nine feet high into the lower level. The flood tore one of the upper lock gates from its hinges and carried it, together with the two lower gates, into the lower level of the canal. Although her engines were in operation the "Nevada" was unmanageable and was turned completely around and carried up against the bank at the lower end of the basin, while the "Glenmount," also under steam, was swept down through the lock into the basin. A barge heavily loaded with sand was torn from its anchorage above the upper bridge and swept through the lock and basin to the lower swing bridge, where it brought up against the fender and bridge girders, doing some damage. A diver and derrick boat have been put at work in the basin to attempt to raise the gates and replace them. A portion of the gate gears that were torn from their frames have been found uninjured and it is hoped that the gates will be found serviceable.

Canadian Consulting Engineers

Mr. A. H. Harkness, Toronto

Mr. A. H. Harkness, senior partner in the firm of Harkness & Oxley, consulting engineers, Toronto, was born in Dundas County, Ontario, in 1873. He was educated at the county public school and at the Iroquois High School, entering the School of Science in 1892 and graduating in architecture, with honors, in 1895. He took a post-graduate course and an honors degree in 1897 and was on the staff of the School of Science from 1898 to 1902. In the fall of 1902, Mr. Harkness accepted an appointment with the Canada Foundry Company and served them in the respective offices of draughtsman, checker, designer and assistant structural engineer. In the summer of 1909 he became supervising engineer on the construction of the St. Andrews dam, afterwards continuing as architectural engineer and salesman until the summer of 1910.

Mr. A. H. Harkness, Toronto

Mr. Harkness went into practice for himself in August, 1910, and admitted Mr. J. M. Oxley in November, 1911. His extended connection with the Canada Foundry Company had given him an expert grasp of the design of structural steel work, and many important commissions have already been entrusted to him or to the firm of Harkness & Oxley during his brief business career. Many noteworthy examples of the firm's work are to be found in Toronto and Winnipeg. In the former city there are the fifteen-storey steel office building of the C. P. R., the ten-storey steel Kent building, the ten-storey Williams building, the stone and steel buildings of Knox College and the steel and brick building of the Y. M. C. A. At Winnipeg there are the Bank of Commerce and the Confederation Life Building. Of the industrial buildings designed by the firm one of the most noteworthy is the extensive plant of the National Land, Fruit & Packing Company at Mimico, Ont., described in detail in our issue of February 7, 1912.

Mr. Harkness is a member of the Engineers' Club of Toronto.

Calgary Looking to Continued Activity

Frequent Announcement of Important New Projects—Proposed Uniform Building Regulations for Western Provinces—Provisions of Calgary's Revised Code

(Correspondence of the Contract Record)

Calgary, Alberta, October 17, 1912.

CONTINUED fine weather has allowed the contractors to make great headway here, and prospects are excellent for a prosperous winter for all the building trades. New building projects are constantly announced and the excavations for the foundations of several buildings are in progress.

The Lougheed Estate are about to erect a ten-storey office building on Eighth avenue. In this structure there will be a new theatre to take the place of the old Empire Theatre, now housing the Pantage vaudeville circuit. The new building will have a 100-foot frontage, and will be 130 feet deep.

Tenders are being called for the new Customs Examining Warehouse, which will have a frontage of 200 feet and will be 112 feet deep, having a basement and four storeys. The ground floor will be 20 feet high and will have an exterior of local cut stone. The three upper storeys, 15 feet high, will be faced with local red pressed brick. The building will be fireproofed throughout, and will be equipped with four freight and one passenger elevators.

Uniform Building Code

On October 24, 25 and 26, there will be held in Calgary, at the invitation of Mayor Mitchell, a convention for the purpose of discussing, preparing, and recommending for adoption a Uniform Building Code for the western provinces of Manitoba, Saskatchewan, Alberta, and British Columbia. The object of the proposed Code is to prepare a blank specification for the use of all municipalities, local conditions governing to be filled in for the particular locality. A synopsis of the proposed code has been prepared, and certain individuals are to present and amplify certain portions, so that each part will be given thorough discussion and consideration. Delegates from all parts of Western Canada, from every large city except Winnipeg, have been appointed to attend and something should grow out of the gathering.

New Building Ordinances

Almost immediately upon appointment to office, Mr. H. A. Sylvester, the new Building Inspector (who, by the way, now rejoices in the title of Superintendent of the Building Department of the city of Calgary) commenced a revision of the by-laws governing the construction of buildings. He found the then existing ordinances to be very much behind the times so far as advanced practice in building construction was concerned, and accordingly set about the task of revising them so as to bring them within the most modern methods and legislation. The matter of the revision was brought to the attention of the City Commissioners, and through them to the City Council, by whom it was referred to the Legislative Committee, who in turn directed Mr. Sylvester to prepare the draft. Altogether the new code has been about four months in preparation, and in the course of the outlining, many suggestions were received from architects, engineers, builders, contractors, property owners, business men and lawyers—in fact the whole range of the men interested in the matter were consulted in regard to particular points, so that the ordinances are to a large extent the outcome of patient inquiry and investigation. The finished Code was submitted to the local chapter of the Alberta Association of Architects for criticism, and many clauses were deleted and others added. The first complete draft was submitted to the Legislative Committee of the City Council, and finally it was placed before the City Council, given its three readings and ultimately passed on October 3rd last. It will be seen that not only was the proposed code subjected to the civic authorities, but that many persons were consulted in the matter. As a result the bylaws contain many unique provisions.

Chief among the new clauses are those relating to modern methods of building construction, not only the mechanical construction, but also those relating more intimately to the public in general. A brief outline of certain provisions will serve to indicate the more interesting of these clauses.

Interesting Provisions of New Code

No construction apparatus, such as derricks, to be used on any job until a certified test has been made showing the load which the apparatus safely withstood, and no such apparatus to be subjected to a greater load than the test allows. Tests will be made allowing a factor of safety of six in the apparatus. This will be a safeguard against using derricks, cranes, &c., for handling loads so great as to endanger the lives of those employed in their use.

All buildings over one storey in height must have concrete foundations at least 7 feet below grade, with footings figured for uniformly distributing the loads.

All buildings over six storeys to be fireproof in the true sense of the word. Fire-towers are to be provided on all buildings having three storeys and over in height, to be enclosed in fire-escapes having indirect access; 8-inch terra cotta outside curtain walls to be allowed up to 14 feet in height.

All business buildings within the city limits over two storeys in height to be of slow burning construction this meaning that if of timber, all exposed surfaces to be furred with metal lath and plastered with ¾-in. cement plaster. All frame business buildings are to have firewalls at least every 50 feet from one outside wall. Brick buildings less than three storeys in height to have fire walls every 50 feet.

Stucco veneer of ¾ in. cement plaster on metal lath may take the place of brick veneer. The side walls of all frame buildings to be at least 30 inches from the lot line. Brick veneer or stucco to be at least 30 inches from the lot line if there be windows on that side. No frame building to be erected on a twenty-five foot lot may be wider than 19 feet.

Reinforced concrete construction is covered by the simple requirement that such construction shall be calculated according to the accepted formulae of present concrete engineering practice.

Regulations Governing Apartment Blocks

The regulations covering the construction of apartment blocks probably were the subject of more criticism than any other single item. Among these provisions it is provided that no apartment house shall be erected in the residential districts without the consent of two-thirds of the owners in the block. Apartment blocks erected in the residential district shall be not less than 10 feet from the rear, feet from each side, and 30 feet from the front lot line. No apartments to be allowed in the basements except janitor's quarters, unless the ceiling be at least 6 feet above grade, when the basement shall be considered as one storey.

Sanitary Requirements

There are many interesting sanitary regulations, among which may be mentioned these: No new building to be occupied by persons unless a certificate has been given out by the Sanitary Inspector. There must be 500 cubic feet of free air for each sleeping person. Ten per cent. of the floor area to be the window glass area for each room. There are to be not more than two rooms between corridors and outside light. All buildings must have positive direct ventilation. Hot-air furnaces must have fresh air supply from the outside air. All residences must set back from the lot line at least 20 feet. All pantries and cupboards for the storage of food must have outside ventilation.

There are regulations governing the amount of gasoline or other cleaning materials that dry cleaning establishments may have on hand at one time. Other regulations governing public buildings, such as garages, liveries, barns, all tend to the one end, the safeguarding of the public health and welfare.

Mr. H. A. Sylvester is a graduate of Union University, Schenectady, N.Y., having the degree of Bachelor in Engineering. He was chosen by the city council out of many applicants, and assumed his office last May.

Personal Mention

Hon. Frank Cochrane, Minister of Railways and Canals, has just completed a tour of the entire route of the proposed deeper Welland Canal.

Mr. W. Worthington has been appointed head of the sewer branch of the Toronto Works Department, with which he has been identified since 1905.

The death took place on October 14 of Mr. William Gillespie, civil engineer, of St. Stephen, N.B. He had been in failing health for some time.

Mr. H. A. Brazier, who has been assistant engineer of London, Ont., for some months, will act as city engineer pending an appointment to fill the vacancy created by the resignation of Mr. G. W. Wright.

The health of Mr. Robt. McCallum, City Architect of Toronto, has sufficiently improved to allow of his leaving that city to recuperate. He expects to return by December first, when his sick leave will expire.

Mr. Harry G. Salisbury, the retiring chief examiner of plans in the City Architect's Department, Toronto, was the recipient of a handsome cut glass water and berry service from the members of the staff with whom he had been associated.

Professor Gillespie, of the University of Toronto, returned recently to the Queen City after spending the summer at Moose Jaw, where he had charge of the installation of a water system for the Walter J. Francis Company, of Montreal. The Moose Jaw supply is being brought 20 miles, from Carron Springs, and the expenditure is estimated at $500,000.

A prominent Montreal contractor in the person of Mr. Matthew Dineen has died at his home. Mr. Dincen, who was born in County Kerry, Ireland, came to Montreal 52 years ago, and for a long time was in business as a landscape gardener. Thirty-two years age he entered the contracting field, and did a large amount of civic work, particularly in the construction of sewers.

A contributor to our Special Annual Number of April 24 last was Sir Maurice Fitzmaurice, C.M.G., then Chief Engineer to the London County Council, since retired into private consulting practice. Sir Maurice received his knighthood from the King upon the occasion of the laying of the corner stone of the new County Hall. Another gentleman who has recently been knighted is a member of the sister profession of architecture, and is a past-president of the British Society of Architects. We refer to Sir Frank Wills, the Lord Mayor of Bristol. The new knight is a Fellow of the Royal Institute of British Architects and has served on the council of that body. He has designed some of the most noteworthy buildings in old Bristol.

Mr. Frank Worthington Simon, the successful architect in the competition for a design for the Manitoba Parliament Building at Winnipeg, was the only architect practising in England chosen to take part in the final contest. The other four firms selected were Messrs. E. & W. S. Maxwell, Montreal; Messrs. Sharp & Brown, Toronto; Messrs. Brown & Vallance, Montreal, and Messrs. Clemesha & Portnall, of Regina. Mr. Simon's professional career is a distinguished one. He is well known as the architect of the Edinburgh International Exhibition of 1890, of the Liverpool Cotton Exchange and of the new Arts Building for the University of Liverpool. Mr. Simon has had very wide experience in competition work. His design for the Manchester Art Gallery received many high encomiums, while that for the Port of London new offices, though not placed, was one of the best submitted. Mr. Simon's home address is Dorset House, East Grinstead. Under the conditions of the competition he will have to maintain an office in Winnipeg during the erection of the Parliament Building.

The Thor Iron Works, Limited

The plant formerly operated by the Canadian Shipbuilding Company at the foot of Bathurst street, Toronto, has recently been acquired by a company organized by a group of Toronto men. The leading figures in the new corporation, which is to be known as the Thor Iron Works, Limited, are Mr. John Malone (formerly of the Toronto Iron Works) President; Mr. John E. Russell (the well known contractor) and Mr. Wm. Snaith (now associated with Mr. Frank Barber, civil engineer) Secretary-Treasurer.

The plant is not only well-equipped for the fabrication of steel tank and plate work, in which it is intended to specialize, but can handle steel roof trusses and light structural work. It is the intention of the new owners, should business conditions justify it, to enlarge the scope of the works to cover structural steel work generally. There is now on hand a large stock of plates of large sizes and of light angles.

The further fact that the plant possesses a well equipped machine shop and one of the largest pairs of shear legs on the water front, should render it of great service to ship owners for marine repairs.

Mr. Russell's thorough knowledge of marine work in general, Mr. Malone's long experience in tank and plate work, and Mr. Snaith's technical and practical ability as an engineer, should guarantee the new company's ability to make a success of their undertaking.

The works are in shape now to give immediate attention and quick deliveries on orders in the lines mentioned.

Good progress is being made in the work on the Valley Railway in New Brunswick. It is the intention to continue the rock work during the winter months.

Mainly Constructional

The News in Brief—From the Atlantic to the Pacific.

The Ontario Agricultural College, Guelph, is to have a new Husbandry building at a cost of $40,000.

Building permits in Toronto are still very active, a great feature being the number of dwelling houses to be erected.

London, Ont., require the services of a city engineer, and applications for the position will be called for shortly.

The city of Windsor, Ont., is in need of a city engineer owing to the resignation of Mr. John W. McConnell. The salary is $1,200 a year.

The city planning commission of Calgary is asking the council to submit a by-law to provide funds for the development of the "city beautiful" scheme.

The city of Sherbrooke, P.Q., has just brought into use a new reservoir, which will give a pure supply of water. The capacity is sufficient for 40,000 people.

Better weather has improved building conditions in Winnipeg and there is a good demand for all classes of houses, but especially for those costing from $3,000 to $10,000.

Considerable opposition has been offered to the proposal to widen Terauley street, Toronto, to only sixty-six feet, many associations asking that eighty-six feet be the minimum.

The proposed by-law, requiring the use of cast iron drain pipes instead of the usual tile pipes is not likely to be passed by the Toronto city council, according to recent enquiries made by this journal.

It is anticipated that a further sum of $300,000 will have to be expended to complete the York County, Ont., good roads system. Up to the present $300,000 has been spent and sixty miles of roadway have been built.

Work will be commenced in the near future on the new Saskatchewan Creamery Company's building at Moose Jaw. The estimated cost of this building, which is to be two storeys, sixty by one hundred feet, is $100,000. The work is hoped to be completed by March, 1913.

The special committee appointed by the city of Victoria to report on the work done by the sewer department finds that a lack of system was responsible for considerable waste of money. $450,000 was voted by the ratepayers last January and this sum has now been absorbed.

According to advices from Quebec, the Government will build the proposed dry dock, which will be operated by the Shipping Federation. Probably it will be constructed on the south side of Levis. Mr. William Price is to be appointed chairman of the reorganized Harbor Board.

Plans for the new municipal abattoir at Toronto are now completed, and tenders for the construction will be asked for as soon as they are approved by the city council. The building will be constructed of concrete and vitrified brick and all exposed walls will be covered with white glazed tiles.

Acting on the advice of the legal department, the Montreal Council has decided to allow the Tramways Company to haul freight until December 1. Contractors complained that in consequence of an action by the city, the company were unable to haul building materials, with the result that building operations were interfered with temporarily.

Mr. F. P. Jones, general manager of the Canada Cement Company, stated recently that although the sales of his company were considerably more this year than last, the earnings would not be as great owing to the large increase in operating expenses. The present capacity of the Canada Cement Company's plants is about twelve million barrels a year, or about twice the annual consumption in Canada.

The St. Laurent parish, Montreal, has granted a 25 years' franchise to the Franco-Belgian Syndicate for a supply of water. The company undertake to construct and operate a filtration plant, the parish having a voice in the selection of the water supply. Questions of contracts for lighting the parish and a street railway service were left over.

The H. W. Cooey Machine Company, manufacturers of dynamometers, have recently shipped one of these machines to Messrs. Pirelli & Company, Milan, Italy, who are large makers of electric cables, etc. The dynamometers manufactured by the Cooey Machine Company are in use by some of the largest cable manufacturers in Canada and the United States.

Mr. Chausse, building inspector of Montreal, has prepared a by-law on the subject of motion picture theatres. Under this enactment, buildings with a gallery or galleries will have to be fireproof, and the compartment for the apparatus will also have to be of fireproof material, which may include brick, tile, concrete, galvanized iron, or their equivalent.

There is a movement on foot to make St. John, N.B., the best equipped Atlantic port nearest to England. Some of the chief objects which are thought desirable are: to move the breakwater farther out to ensure better shelter; the reclamation of a large tract of land to attract new industries; a good publicity campaign; a careful scheme of colonization, and the beginning of practical work in securing new settlers for the province.

Announcement has been made by the National Sanitarium Association that competitive designs have been asked for the erection of a handsome building on College street, Toronto, near the Medical School and University, covering a lot 75 x 140 feet. The building when completed is to be identified with the King Edward Memorial Fund for Consumptives, and will be used for the head offices of the Sanitarium Association.

Catalogue No. 205 of the Sturtevant Engineering Series is devoted to the gasoline electric generating sets of B. F. Sturtevant Company, Boston, Mass. These sets are built to supply the demand for economy and facility of operation. The builders have endeavored to make these sets capable of giving as reliable and as satisfactory service as a well managed central station. The booklet is well illustrated and concise, though comprehensive in the field that it covers.

The Canada Steel Company, Hamilton, have decided upon the construction of a large mill in addition to their present plant. The building will be some 40 by 300 in dimension and will be of steel and sheet metal construction. It will be operated electrically throughout and will be equipped with an 8-inch mill for rolling small steel shapes, such as rounds, squares and twisted squares, ⅜ inch up to 9-16 inch, small flats, bands, small angles and channels. The railroad siding is already in place and building operations will be commenced forthwith. The cost of the addition is estimated at $65,000.

Messrs. Thomas & Smith, Inc., 116-118 North Carpenter street, Chicago, Ill., have just published under the title "Suggestive Specifications" covering "Economy" pumping machinery of their manufacture, a set of specifications on pumping machinery especially adapted for the purposes of Artesian water supply, seepage, ejection, etc. These are arranged in a very convenient manner and supply a large amount of information useful to the architect. These spe cifications have been prepared in strict compliance with the most advanced practice in this line. A copy may be secured upon application

Messrs. Thos. Piggott & Company, Limited, the well known iron founders, general engineers and contractors, of Birmingham, Eng., report a growing trade with Canada. They have recently supplied large quantities of steel pipes, among their contracts being an order from St. Boniface, Man., for 5,081 feet run steel pipes 24 in. diameter and 3/8 in. thick, and from Vancouver an order for 7,000 feet run 20 in. diameter and 2,000 feet run 24 in. diameter 5/16 in. thick. They now have in hand a contract for Vancouver for 12,000 feet run 24 in. diameter by 5/16 in. and 12,000 feet run 24 in. diameter by ¼ in. The company's patent pressed steel tanks are also meeting with a good demand in the Dominion, while the firm have also supplied several corrugated furnaces for marine boilers.

The Linde Canadian Refrigeration Company, Ltd., Montreal, have been appointed sole Canadian agents for Kynoch, Ltd., Witton, near Birmingham, England, for the sale of their gas engines and gas producer plants. Hitherto there has been some difficulty with British gas plants on account of the differences between British coal and the hard American coal used on this side, but this has been overcome, and Kynoch, Ltd., will manufacture a plant specially designed for use in Canada. Kynoch, Ltd., took the precaution to thoroughly investigate Canadian conditions before attempting to put their productions on this market, and the result is the manufacture of a plant which will obviate all trouble experienced before. The company have decided to cater thoroughly for Canadian users of gas engines and gas producer plants.

Three large rotary kilns, each 140 feet in length, 8 feet in diameter, have been consigned to the Edmonton Portland Cement Company, Marlboro, Alta., from Reliance, Ohio. It was quite an undertaking for the railway companies to transport these kilns a distance of over 3,100 miles, and the track curves and bridge clearances were carefully checked in advance. Progress is being made at the plant, and it is expected that it will be in operation in December or early in January. The plant is designed to turn out 1,500 barrels of cement a day, the company having marl and clay supplies for at least forty years. The plant will have cost $650,000 when completed. Five hundred cars of material and machinery, of which more than 300 cars were supplied locally, were required.

Winnipeg is to have a new cold storage warehouse which will cost $250,000 without estimating the interior fixtures. This plant is now under construction for the Manitoba Cold Storage Company, Limited. The structure is 111 by 150 feet, representing a space of a little over 1,200,000 cubic feet, and when completed it will have eight storeys—seven storeys and basement—with a foundation capable of carrying ten storeys. The building is so constructed that the interior floors, partitions, etc., are entirely independent of the outside walls, the floors reaching up to but not being embedded in, or supported by their outside walls at any point. The outside walls are but a shell encasing the interior, which stands on its own foundation and supports, regardless of the heavy walls about it. All interior floors and numerous heavy pillars supporting them, are constructed of reinforced concrete, and virtually form a single continuous body of concrete. Both outer and inner walls are brick from bottom to top, with a 12-inch space between, packed with granulated cork. The huge columns around the outside of the building are split and six inches of nonpariel cork board between each, also the columns along the corridor walls. Partitions walls are built of 6-inch nonpariel cork board, consisting of two layers, all joints broken horizontally and vertically in each, and plastered with half an inch of Portland cement mortar. The columns in the basement are insulated with one layer of 3-inch nonpariel cork board, set directly against the concrete in a bed of half-inch cement mortar. The floors are insulated with six inches of nonpariel cork board, consisting of two three-inch layers. The first layer is set directly against the first layer in a bed of cement, breaking joints both ways. The building and plant were designed by Mr. D. I. Davis, of Chicago.

28,000 hp. Zoelly Steam Turbine

The firm of Escher Wyss & Company, Zurich, Switzerland (Canadian Office, Montreal), has recently delivered to the Rheinisch-Westfalischen Electric generating station in Essen the most powerful steam turbine ever built. When running at a speed of 1000 revolutions per minute it develops 22,500 h.p. eff. under normal continuous working, with a pressure of 150 lbs. per square inch gauge and a steam temperature of 572 deg. F. at the stop valve and a vacuum of 27.5 inch. (A higher vacuum cannot be obtained owing to the fact that only recooled water is available for the condenser.) The turbine is also capable of developing 28,000 h.p. continuously and 30,000 h.p. for short periods.

This turbine is of the well known standard "Zoelly" type, of which the Escher Wyss Company have turned out over 225 up to the present, aggregating a total output of about 500,000 h.p. The machine has 14 runner wheels, mounted on a strong steel shaft, the total weight of the rotor being 26 tons. The total weight of the generator rotor (Siemens Company's make) approximates 60 tons.

The two rotors coupled together are supported by four bearings being supplied with about 130 gallons per minute of oil for lubrication. This oil is under pressure produced by a pump driven from the main shaft. During the period of starting the main unit, the pressure oil is produced by a small centrifugal pump connected directly to a separate tiny steam turbine. When the main unit has attained full speed, this auxiliary turbine is shut down. The oil is conducted from the bearings to an oil tank, where it is cooled down in solenoids of copper, and is then pumped back to the bearings. The oil is consequently used over and over again and only from time to time a small quantity is needed to replenish the supply.

The exhaust steam is led through a branch of 8 feet diameter to the surface condensing plant, located beneath the turbine, the cooling water being supplied from a cooling tower. A separate turbo-pump then delivers the condensed steam into a hot well, from which the water is in turn delivered to the boiler feed pump.

The attendance of this gigantic turbine driven alternating unit with its condensing plant is undertaken with ease by three men on each shaft.

An unique adaptation of the principle of the slide rule as a labor-saving device for hydraulic and structural engineers has recently been copyrighted by the Des Moines Bridge & Iron Company, of Pittsburgh. The calculator is made of a heavy cardboard slide working in a celluloid envelope or sleeve. It is made in a vest pocket size and should be very valuable to engineers for this reason. One side of the calculator is arranged to solve a wide variety of beam problems, such as the safe uniform or concentrated loads for I-beams, channels or Bethlehem sections; or conversely the section required for any given loading, and the deflection under these conditions. The reverse side is used in designing standpipes, tanks, boilers and steel pipe when under various conditions of pressure. The results may be obtained for any desired joint efficiency, and as mentioned before with any two of the conditions known the third is readily found. Readers of the Contract Record will receive one of these calculators upon application to the Des Moines Bridge & Iron Company, at 945 Curry Building, Pittsburgh, Pa.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Dundas, Ont.
Water pipe. Clerk, Jno. S. Fry. Chairman, Fire & Water Committee, W. H. Moss. About 800 ft. of 4-in. pipe for water supply will be required.

Keewatin, Ont.
Street improvements and drainage planned by town council. Clerk, W. J. Craig. Ratepayers will be called on shortly to vote on by-law.

Listowel, Ont.
Pavements. The Bell Telephone Co. will place its wires under ground on Main, Wallace and Mills streets, and the council will at once prepare plans, etc., for paving the streets. Clerk, Wm. Bright, will call for tenders when plans are ready.

Marmora, Ont.
Cement walks planned. By-law will be submitted. Clerk, H. W. Sabine.

Montreal, Que.
Sewers, Notre Dame de Grace Ward. Board of Control. Engineer, Major S. Howard. Tenders received by secretary L. N. Seneca1 until Oct. 23rd.

Ottawa, Ont.
Asphalt pavement. Sec., J. Henderson. Engineer, N. J. Ker. Tenders received by council for 12,662 sq. yards asphalt pavement, 6798 lin. ft. of gutter.

Rivers, Man.
Sewers for Rivers Realty Co., 806 Nanton Blk., Winnipeg. Company now receiving tenders for sewer from 9th Ave. in Chamberlain Heights sub-division to the Little Saskatchewan River.

Vancouver, B.C.
Paving to cost $2,000. Westminster road. Clerk, W. McQueen. Engineer, F. Fellowes has been instructed to call for tenders.

Waterworks, cost $632,000, planned, Seymour Creek. City Engineer, F. Fellowes. Consulting engineers, Hermon & Burwell, 423 Hamilton street. A committee and the consulting engineers are looking into the matter.

Wingham, Ont.
Paving. Town Council will take up matter of paving Main street at next meeting. Clerk, Jno. F. Groves.

Winnipeg, Man.
Sewers, cost $5,377, planned for Redwood ave., Battery and Emily streets. Clerk, C. J. Brown.

Pavements and sidewalks, cost $172,912, planned. Asphalt pavements on Portage and Elgin aves. Granolithic walks on Sherburne street, Gertrude and Cobourg avenues and Broadway, also plank walks on a number of streets. Clerk, C. J. Brown.

Municipal improvements planned, Kildonan, for Rural Municipality of Kildonan. Sec.-treas., Harry Thompson, 215 Chambers of Commerce, Winnipeg. Council contemplate the construction of a number of new sidewalks, public wells, ditching and grading and sewer construction. Full particulars from secretary.

CONTRACTS AWARDED

Montreal, Que.
Cement block plant to cost $4,800. Clarke & Van Horne. Owner and builder, P. N. Tranan, 8 Van Horne. 3-sty., 85 x 100, cement foundation, concrete block construction.

Niagara Falls, Ont.
Brick pavements, McRae street. Clerk, W. J. Seymour. Engineer, J. C. Gardiner. General contractors, McRae & Campaign, Niagara Falls.

Paving to cost $4,000, Armoury ave. Clerk, W. J. Seymour. Engineer, J. C. Gardiner. General contractor, Westrumite Ltd., 40½ Dalhousie street, Brantford, Ont.

St. Catharines, Ont.
Sewers to cost $43,000. Engineer in charge, W. D. Scott. General contractor, Thos. Riley, 72 James street. 2 miles long 20 ft. deep, 24-in. pipe.

Victoria, B.C.
Paving to cost $25,000. Engineer, C. H. Rust. General contractors, Canadian Mineral Rubber Co., Labor Exchange Bldg. Gorge Road from Manchester road to Carroll street.

Railroads, Bridges and Wharves

Ayr, Ont.
Sidings for C. P. R. The company have been authorized to construct 3 spurs for The Sand & Supplies Ltd., on Lot 31, con. 9, twp. North Dumfries, Co. Waterloo, Ont., near Ayr.

Barrie, Ont.
Sidings for G. T. R. The Board of Ry. Commrs. have authorized G. T. R. to construct branch line for W. Gracey & Sons, also for Queen City Oil Co.

Bassano, Alta.
Extension branch line. C. P. R. company have been authorized to construct Bassano to Irricane branch from mileage 36.8 near Standard to mileage 50.3 near Hussar, Alta.

Brantford, Ont.
Siding. G. T. R. Co. have been authorized to construct siding for the Pratt & Letchworth Co., Brantford, and also a bridge over Grand River.

Brockville, Ont.
Engineers of the C. P. R. and C. N. R. have been surveying for subway on Edward street.

Calgary, Alta.
Spur. C. P. R. Co. have been authorized to construct spur for Canadian Western Natural Gas, Light, Heat & Power Co., Ltd.

Cap-a-l'Aigle, Que.
Extension to wharf, Charlevoix Co. Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Plans, specifications, etc., at Dept. Public Works, at offices of A. R. Decary, dist. engineer; Post Office Bldg., Que.; J. L. Michaud, dist. engineer, Merchants Bank Bldg., St. James street, Montreal, and Postmaster at Cap-a-l'Aigle, Que. Specifications and form of tender at office of MacLean Daily Reports, Ltd., Toronto and Montreal. Tenders received by sec. until Nov. 11.

Coquitlam, B.C.
Depot to cost $20,000 for Canadian Pacific Railway. Head Office, Montreal. Brick and stone construction. Plans prepared.

Fitzroy Harbor, Ont.
Bridge. C. N. O. Ry. Co. have been authorized to reconstruct bridge across Ottawa River, at Fitzroy Harbor, Twps. Fitzroy and Onslow, 37.32 miles west.

Forresters Falls, Ont.
Station for C. N. O. Ry. The Board of Ry. Commrs. have approved of work.

Goble's, Ont.
Station planned for Grand Trunk Ry. The Bd. of Ry. Commrs. have approved of the style and location.

Islington, Ont.
Bridge plant. Dom. Bridge Co., Montreal, Que., will erect storage sheds, assembling and steel shops and install powerful lifting cranes for extensive railway construction in and around Toronto.

Kamouraska, Que.
Pier extension for Dom. Govt. Dept. of Public Works. Plans, specifications, etc., at Dept. Pub. Wks. and at offices of A. Tremblay, dist. engr., Montmagny, Que.; A. R. Decary, dist. engr., Post Office Bldg., Quebec, Que., and Postmaster at Kamouraska. Specifications and form of tender also at offices of MacLean Daily Reports, Toronto and Montreal. Tenders received by secretary, R. C. Desrochers, Ottawa, until Nov. 11, 1912.

Ile-Aux Courdes, Que.
Extension to wharf, Charlevoix Co., for Dom. Govt. Dept. of Public Works. Plans, specifications, etc., at Dept. of Public Works, at offices of A. R. Decary, district engineer, Post Office Bldg., Quebec; J. L. Michaud, dist. engr., Merchants Bank Bldg., St. James St., Montreal, and Postmaster, Ile-aux Coudes, Que. Specifications and form of tender also at MacLean Daily Reports, Toronto and Montreal. Tenders received by secretary, R. C. Desrochers, Ottawa, until Nov. 5.

L'Islet, Que.

Wharf superstructure for Dom. Govt. Dept of Public Works. Plans, specifications, etc., at Dept. Pub. Wks. and at offices of J. A. Tremblay, dist. engr., Montmagny, Que A. R. Decary, dist. engr., Post Office Bldg., Quebec, Que., and Postmaster at L'Isler. Specifications and form of tender also at offices of MacLean Daily Reports, Toronto and Montreal. Tenders received by secretary, R. C. Desrochers, Ottawa, until Nov. 11th.

Twp. of London, Ont.

Spur. G T. R. Co. have been authorized to construct spur for the Battle Creek Toasted Corn Flake Co. Ltd., on lots 18, 6, 5, 4, 3 and part of 10, con. "C" twp. of London, Ont.

London, Ont.

Bridge, Wharncliffe Road. Tenders received by chairman Comm. No. 2, until Nov. 13 for bridge 270 ft. span, pin connected. Petit Trust Bridge with necessary approaches, concrete piers and abutments. Plans and form of tender at office of engineer, Geo. W. Wright.

Longueuil, Que.

Dredging. Dom. Govt. Dept. of Pub. Works. Sec., R. C. Desrochers, Ottawa. Specifications and form of tender at Department Public Works, Ottawa, and MacLean Daily Reports, Toronto. Tenders received by secretary until Oct. 29th.

Medicine Hat, Alta.

Spurs. C. P. Ry. Co. have been authorized to construct 2 spurs for Purmal Brick Co. Ltd.

Niagara Falls, Ont.

Bridge. G. T. Ry. Co. have been authorized to construct bridge carrying Victoria avenue across its tracks. Local manager, D. Morice.

Ottawa, Ont.

Wharf and freight sheds to cost $100,000. Dom. Govt. Dept. of Pub. Works. Sec., R. C. Desrochers. Iron and concrete construction. Plans in progress.

Pointe Aux Trembles, Que.

Bridge for Canadian Northern Quebec Railway. The Board have approved of the plans to replace timber trestle over Montreal Terminal Ry., Bout de L'Ile, Parish of Pointe Aux Trembles, 12 miles from Montreal.

Regina, Sask.

Branch line for G. T. P. Branch Lines Co. The Board of Commrs. have approved of the revised location of the Regina-Boundary Branch from East Line Sec. 11, Tp. 3 R 4 W 2 M mileage 91.13 to 135.93 Dist. of Cannington.

Ste. Adelaide de Pabos, Que.

Extension to breakwater, Gaspe Co., for Dom. Govt. Dept. of Public Works. Plans, specifications, etc., at Dept. Public Works, at offices of J. T. Bertrand, dist. engr., Ile Verte, Que.; A. R. Decary, dist. engr., Post Office Bldg., Que., and Postmaster at Ste. Adelaide de Pabos, Que. Specifications and form of tender also at MacLean Daily Reports, Toronto and Montreal. Tenders received by secretary R. C. Desrochers, Ottawa, until Nov. 6th.

Ste. Anne De La Pocatiere, Que.

Tenders received by secretary, R. C. Desrochers, Ottawa, Dom. Govt. Dept. of Public Works, until Nov. 11th. Specifications, at office of J. A. Tremblay, district engineer, Montmagny, Que.; A. R. Decary, dist. engr., Post Office Bldg., Quebec; Postmaster, Ste. Anne de la Pocatiere, and MacLean Daily Reports, Toronto and Montreal.

St. Boniface, Man.

Bridge. Clerk, J. B. Cote. Engineer, M. P. Blair. Ratepayers to vote on Dec. 17, 1912, on alterations to bridge over Red River at Norwood.

St. Catharines, Ont.

Railway (extension). Can. Northern Ry. (Niagara, St. Catharines & Toronto Division) company have secured right of way to Niagara-on-the-Lake, awaiting sanction of railway board to cross G. T. yards.

St. John, N.B.

Cribwork and concrete wharf, Dominion Government, Department of Marine & Fisheries; Deputy Minister, Alex. Johnston, Ottawa. Tenders received by Deputy Minister until November 1st. Plans, etc., at office of Department, Ottawa, offices of Department, St. John, N.B., Halifax, N.S., and Sydney, N.B.

Ste. Victoire, Que.

Wharf, County of Richelieu. Tenders received by Sec., R. C. Desrochers, Ottawa. Dom. Govt. Dept. of Public Wks., until Nov. 11th. Specifications at office of J. L. Michaud, district engineer, Merchants Bank Bldg., Montreal; A. R. Decary, district engineer, P. O. Bldg., Quebec, Que.; Postmaster Ste. Victoire, Dept., Ottawa, and MacLean Daily Reports, Toronto and Montreal.

Silverdale, Ont.

Station for Toronto, Hamilton & Buffalo Ry. The location of a station at Silverdale has been approved of by the Board of Ry. Commrs.

Tavistock, Ont.

Bridge. G. T. R. Co. have been authorized to reconstruct bridge No. 39 mile post 104.01 20th District, middle division, 3.97 miles from Tavistock, Ont.

Toronto, Ont.

Improvement to water front and harbor to cost $15,000,000, Ashbridge Marsh, for City Council Harbor Commrs. Sec., A. C. Lewis. Engineer, C. V. Cousins, Bell Telephone Bldg.

Victoria, B.C.

Spur. Esquimalt & Nanaimo Ry. Co. have been authorized to construct spur for The B. C. Pottery Co. Ltd., also one for J. E. Painter & Sons from a point on its line 1.35 west of Victoria and one for Sweeney Cooperage Co. Ltd., from a point on its line 1.6 miles west of Victoria.

West Vancouver, B.C.

Improvements to ferry and docks to cost $100,000. By-law passed and tenders will be called shortly.

Whitby, Ont.

Railway. G. T. R. Co. have been authorized to construct siding for the Hospital for the Insane at Whitby.

Winnipeg, Man.

Bridge. Interested—Jas. Fahey, c/o Arlington Hotel. A petition is in circulation for bridge over Red River at foot of Market street connecting with St. Boniface. Board of Control. Sec. M. Peterson.

CONTRACTS AWARDED

Edmonton, Ont.

Electric railway construction, 300 miles. Edmonton Interurban Ry. Co., J. H. Pichard vice-pres., 248 Jasper Ave. J. W. McLeod has contract for first unit of 6 miles to St. Albert where power house will be erected, the equipment for the St. Albert line will be 10 60-passenger coaches and 50 freight and coal cars, the lines proposed for next year radiating from Edmonton are: Beaver Lake & Tofield 40 miles. Pigeon Lake 40 miles, Vegreville 60 miles, Lac Ste. Anne 56 miles, Nanayo 12 miles, Morinville 18 miles.

Fredericton, N.B.

Railway to cost $726,000 for Fredericton and Grand Lake Ry. Co., c/o R. B. Hanson. General contractor, A. E. Trites, Salisbury, N.B. Sub-contractors, Hibbard Construction Co., Woodstock. Work on spur line from lower St. Marys to Marysville will not be started until early spring.

Kalso, B.C.

Railway construction to cost $300,000, for C. P. R. (Kalso & Slocan Ry.). Res. engineer, M. K. McQuarrie, Revelstoke, B.C., has been instructed to start work at once between Bear Lake and Whitewater. Mr. Tierney will also standardize the old Great Northern into Kalso, 5 trestles will be replaced with fills, 80 lb. rails and No. 1 ties to be used.

L'Assomption, Que.

Bridge over River L'Achigan. Sec., Jos. E. Duhamel. General contractor, F. R. Riopel.

Moose Jaw, Sask.

Addition to car barns, cost $30,000, for Moose Jaw Electric Railway Company. General contractors, P. Lyall & Sons, Transportation Bldg., Montreal.

Ottawa, Ont.

Distributing stration to cost $3,500, Albert street, for Ottawa Electric Ry. Albert street. Builder, Chas. Holbrook & Son, 420 McLaren street.

Port Arthur, Ont.

Store Building for C. N. Ry., Winnipeg, Man. Chief engineer, W. M. McLeod, Winnipeg. Architect, R. B. Pratt, Union Station, Winnipeg. General contractor, J. H. Simmons, 275 Oakwood ave., Winnipeg. 1½ storeys, 19 x 30, concrete foundation, frame and corrugated iron construction, concrete basement.

St. Catharines, Ont.

Concrete bridge to cost $75,000, for Municipal Council. Mayor, Dr. Merritt. Engineer in charge, W. D. Scott. Concrete bridge 750 ft. long, 70 ft. above water level. Work being done by city engineers, day labor.

St. John, N.B.

Extension to street railway to cost $35,000 (to Kane's corner). Manager, H. M. Hopper, Dock street. President, James Manchester, c/o Bank of New Brunswick, Prince William street. Engineer, Geo. N. Hatfield, 122 Broad St. Extension of 2/3 mile with electric semaphore. Work done by day labor.

Summerside, P.E.I.

Dredging to cost $15,000. Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, Dominion Dredging Co. Ltd., Ottawa. Approach to Queen's Wharf, about 50,000 cu. yds. material.

Sutton, Que.
Highway bridge (over Missisquoi River.) Sec., C. Taite. Engineer in charge, L. G. Vallee. General contractors, Jenckes Machine Co., Sherbrooke. Steel bridge, concrete abutments. 1 span 40 x 18.

Public Building, Churches, Schools, etc.

Belleisle Bay, N.B.
Boy's Home planned. Dr. Oscar Watson, Bath Beach, N.Y., has purchased farm, will erect 1 large and several smaller buildings, also rebuild present buildings. Manager, Robt. A. Watson, 16 Peter street, St. John.

Calgary, Alta.
Schools. The School Board purpose erecting new buildings. Bridgeland, Elbow Park and Grand Trunk districts.

University to cost $250,000. Competitive plans for main building called, competition open to all architects.

High School in Crescent Heights is under consideration of the School Board. Plans will be prepared.

Harriston, Ont.
Moving picture theatre. John Blohm has secured hall in Oddfellow's Block and will removel for theatre. Seating equipment, electric lighting and interior finishing required.

London, Ont.
Church planned for The Christian Church Congregation, Dundas street. Pastor, Rev. B. H. Haydn, 711 Lorne avenue. Brick construction. Meeting will be held shortly to discuss plans.

Marmora, Ont.
Town Hall, cost $6,000, is planned by the town council and ratepayers will vote on by-law shortly. Clerk, H. W. Sabine.

Midland, Ont.
Tenders received by A. Johnston, Deputy Minister Marine & Fisheries, Ottawa, until Nov. 4 for construction of a wooden lighthouse tower; a steel skeleton tower and an oil shed. Plans, etc., at Midland, Victoria Harbor, Collingwood and Owen Sound. Endorse "Tender for Midland Range Lights."

Public building. Dominion Government, Department of Public Works Secretary, R. C. Desrochers, Ottawa Plans, specifications, etc., at Department of Public Works, at office of Mr. Thos Hastings, Clerk of Works, Postal Station "F" Yonge street, Toronto, and at P. O. Midland. Specifications and form of tender also at MacLean Daily Reports, Toronto and Montreal. Tenders received by secretary until November 5

Montreal, Que.
Addition to building to cost $4,500, St. Catherine E., for Cie Mutrelle d'Immeubles, 502 St. Catherine E. Architect, Venne & Labelle, 5 Beaver Hall Sq. 3-sty., 22 x 100, stone foundation, brick and structural steel construction. Plans ready.

Citadel will be erected for The Salvation Army on City Hall avenue near St Catherine street. The present building will be demolished and plans prepared for modern structure. Chancellor Staff Capt., T. Walton, 341 University avenue

Rosetown, Sask.
Hospital planned. Sec.-treas., S. B. Robinson. By-law will be submitted Oct. 31st to provide funds for hospital buildings.

St. Catharines, Ont.
Fire Hall to cost $10,000, Lake street. Mayor, Dr. Merritt. Engineer and architect, W. D. Scott. 2-sty., brick construction. Plans being prepared.

Sudbury, Ont.
School, cost $32,000, Ryan Ward. Secretary, James Fowler. Architects, Ellis & Connery, Manning Chambers, Toronto. Tenders received were too high. Other plans now being prepared. Two storeys.

Todmorden, Ont.
Addition to St. Andrews Church planned. Rector, Rev. Alfred A Bryant, 641 Broadview avenue, Toronto. Will enlarge present building and install electric lighting, fixtures and hardwood seats.

Toronto, Ont.
Postal station, College and Augusta avenue, for Dom. Govt., Postal Dept. Representative P. W. Dept., T. A. Hastings, Station F, Yonge and Charles streets.

Church for Howard Park Methodist Congregation. Pastor, Rev. E. B. Lanceley, 127 Westminster ave. Committee has been appointed to canvass for funds and plans will be prepared.

Waterford, Ont.
Library, cost $6,000, Main and St. Clair sts. Red brick construction, ornamental stone trimmings, general libraray fixtures required. Clerk, W. S. Fuller, will call for tenders as soon as plans are completed

Winnipeg, Man.
Central market. The Central Farmers' House Committee of the "Million for Manitoba League," Industrial Bureau Bldg., is backing project. Arch., P. C. Samwell, 516 Builders Exchange, has prepared tentative plans. 186 x 137, brick construction, galvanized iron and skylight; main part of building 1-sty.; on 2nd storey will be restaurant, caretaker's apartments and public bath

Remodelling Auditorium Rink, York and Garry streets. Manager, J. C. Curle. Architect, D. W. F. Nicholas, 199 Main street. Work will be done by day labor. Part of roof to be raised 2 galleries put in and probably steam heating

Conservatory planned for Prov. Govt. Dept. of Agriculture. Deputy Minister, J. J. Golden. Prov. arch., V. W. Horwood, Parliament Bldg. Concrete and steel 98 x 50 in connection with the Horticultural Bldg. at the Manitoba Agricultural College

CONTRACTS AWARDED

Brockville, Ont.
Fittings, Post Office. Dom. Govt. Department of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, Fred W. Clow

Chicoutimi, Que.
Seminary, to cost $[illegible],000, Cartier street, for Le Seminaire De Chicoutimi. Architect, R. P. Lemay, Quebec. General contractor, J. Morrissette, Quebec and Chicoutimi. Heating system, A. Picard, Quebec. Three buildings, five storeys, each 150 x 60

Lethbridge, Alta.
Church, cost $5,000, Niven and Nanton streets, for St. Marys Anglican Church Congregation, North Ward. Rector, Rev. C. H. Popham. General contractor, James Pearson. Seating capacity 300.

Montreal, Que.
Addition to Customs Express Examining Warehouse to cost $6,390. Youville and Normand streets. Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General rontrastor, Antoine Kelly, 1955 St. Urbain street.

Picture theatre extension to cost $50,000, for H. Pulos, 339 St. Lawrence Bvd. Architect, D. J. Crighton, Jacobs Bldg. General contractors, Picard & Valin, 1298 Bordeaux. Ornamental iron, Union Architectural Iron Works, 346 St. Charles Borromee street.

Public lavatory to cost $19,000, Cartier Sq. Engineer, G. Janin, 32 Salaberry Apts. General contractor, T. Lessard, 191 Craig street E. 25 x 50, cement foundation, reinforced concrete construction.

New Westminster, B.C.
High School to cost $120,000. Architects, Gardiner & Mercer, West Trust Blk. General contractors, Atkison & Dill, Welton Bldg., Vancouver. 3-sty., 170 x 74.

Ottawa, Ont.
Masonic Temple to cost $90,000, Metcalfe street. Architect, J. A. Ewart, Sparks Chambers. Mason, Alex. Garvock. Carpenter, J. & C. Low, 262 Catherine street. 5-sty., 61 x 92.

Outremont, Que.
Addition to fire hall. Mayor, Mr. Beaubien, 543 St. Catherine road. Architect, Hutchison, Wood & Miller, Royal Insurance Bldg., Montreal. General contractor, Gray & Wighton, 214 Pine Ave. W., Montreal

Port Hope, Ont.
Interior fittings, Post Office, to cost $4,939 Dom Govt., Dept. of Public Works Secretary, R. C Desrochers, Ottawa General contractor, The J T Schell Co., Alexandria, Ont

St. Catharines, Ont.
Alteration to fire hall to cost $6,000, St Paul street Architect, F. H. Wiley Mason, J Stevens Carpenter, Geo Wilson 2-sty., brick construction, shingle roofing

Sydney, N.S.
2 schools to cost $20,000 each. Chairman, Mayor A. D. Gunn. Supervisor, A. W. Woodhill. General contractor, Rhodes Curry & Co. Foundations in

Business Buildings and Industrial Plants

Amherst, N.S.
Office building to cost $[illegible], for R[illegible] Engineering Co. Concrete and wood construction. Tenders received [illegible] by owner

Bassano, Alta.
Factory planned for The Springfield Machine Co. Representative, P. T. Montana, Pres. Bd. of Trade, R. C. Peeler. Negotiations are in progress with the Board of T

Calgary, Alta.

Warehouse, workshop and office to cost $20,000, Manchester, for Canada Stock Food Co. Architect, Lang & Major 1-sty., 42 x 100, brick, cement foundation. Plans in progress.

Canora, Sask.

Plant Canora Mfg. Co. will erect immediately the first series of buildings, 40 x 80, boiler shop, foundry and general repair shop will be erected later.

Edmonton, Alta.

Bakery to cost $25,000, for Charles Brown. Architect, J. E. Caushon, Jr. 2-sty., brick and steel construction. Plans prepared.

Office building to cost $200,000, Jasper avenue, for James W. Horne. 4-sty. Plans in progress.

Elmira, Ont.

Felt shoe factory. F. Nolinsky has purchased old button factory and will fit it up as childrens felt footwear factory. Additional machinery will be required.

Hamilton, Ont.

Hotel to cost $900,000 planned for United Hotels Co. Representative, F. A. Dudley, Niagara Falls, N.Y., is negotiating for a site.

Office and vault for Hamilton Cemetery Board. Sec., F. J. Rutherford, Hamilton Cemetery. Tenders called.

Ice cream factory, Mulberry and Railway streets, for Burke Bros., Railway & Mulberry streets. Architect, J. A. Armes. 2-sty., 28 x 50, refrigerating plant required. Tenders to be called shortly.

Kamloops, B.C.

Hotel to cost $130,000 planned for a syndicate. M. B. Usher of Vancouver is interested.

London, Ont.

Repair shop and supply house, cost $25,000, for The Ford Automobile Company, Walkerville. Work will start as soon as suitable site is selected. Plans in progress.

Extension to stove foundry, cost $7,000 planned for McClary Mfg. Co., Wellington and York streets. Manager, Col. Wm. Gartshore. Building to be an extension to the south end stove works. Plans for further extensions are to be prepared.

Medicine Hat, Alta.

Factory planned for Westaskiwin Bedding Co., Westaskiwin. Interested, Messrs. Ouim & Boucher. 4 buildings, 1 and 2-sty., 150 x 50; 1-sty., 50 x 50, and 2 smaller buildings, frome construction covered with iron.

Midland, Ont.

Dry kiln. Benson & Bray Company contemplate installing dry kiln and are in the market for large matcher and edger.

Moose Jaw, Sask.

Bank to cost $100,000, River street, for The Royal Bank of Canada. Local manager, F. G. D. Cameron. 3-sty., brick construction. Excavation to start at once.

Flour mill for Union Mills Co., Minneapolis, Minn. President, A. C. Van-Haglan. Plans in progress.

Addition to glass factory to cost $15,000. The Saskatchewan Glass & Supply Co. will erect a leaded light and bevelling plant.

New Hamburg, Ont.

Factory, cost $70,000, for the Silversmiths Co., Ltd. Interested, Daniel Ritz, Peel street. By-law passed and plans will be prepared.

North Battleford, Sask.

Mill for National Cordage Co., Ltd. Representative, E. Harlan Ely. Plans in progress.

Parry Sound, Ont.

Factory for The Canadian Explosives Ltd. A by-law will be submitted to the ratepayers of McDougall Twp. to allow above company to erect large factory.

Pembroke, Ont.

Factory for Pembroke Box Factory. Ratepayers passed by-law granting bonus of $5,000 to company.

Port Alberni, B.C.

Sash and door factory for Syndicate. Interested—H. B. Burgess, San Francisco, Cal. Plans being prepared.

Redcliffe, Alta.

Plant for Redcliffe Rolling Mills & Bolt Co. Plans are being prepared, machinery required.

Red Deer, Alta.

Warehouse. B. F. Ackerman, Peterboro, contemplates erecting wholesale distributing warehouse for harness and horse clothing business.

Regina, Sask.

Six stores and picture theatre for R. A. Carmon. Architects, Brown & Vallance, 1006 McArthur Bldg., Winnipeg, are preparing plans. Work to start this fall.

Sackville, N.B.

3 stores planned for Fawcett Bros., Capt. Peter Hanson, James H. Teare. Brick construction.

Laundry. L. C. Carey will rebuild building recently destroyed by fire. Brick and concrete construction, laundry machinery required.

St. John, N.B.

Office building (extension) West end, for Canadian Pacific Railway, head office Montreal, Que. Architect, Company's architect, Montreal. 2-sty., 50 x 100, concrete foundation, frame construction. Plans ready.

St. Thomas, Ont.

Addition to foundry for The Erie Iron Works. President, W. G. Rogers. By-law passed granting company $15,000 towards extending their present plant.

Toronto, Ont.

Hotel. M. Sheedy, proprietor Hotel Grosvenor, Alexander and Yonge streets, has purchased site, 50 ft. frontage, for larger hotel accommodation.

Paint shop to cost $15,000, Abell St., for Canadian Rumley Co., Abell street. Architect, C. F. Thompson, c/o owners. Brick and structural steel construction, stone foundation. Plans drawn.

Brick plant. Jno. Price, 86 Greenwood avenue, will erect 7 new kilns for winter burning.

Factory for Cowans Ltd., Sterling rd. Architects, Prack & Perrine, Hamilton. 4-sty., 60 x 210, cement foundation, reinforced concrete and brick construction. Plans drawn.

Garage to cost $4,000, 848 Bathurst street, for M. A. Craft, 118 Barton Ave., builder. Architect, J. Hunt, Stanford, Bloor and Ossington avenue. 1-sty., brick, brick foundation. Plans drawn.

Hotel planned for The Humber Beach Hotel Co. Interested—A. L. Solman, Genesee Hotel, 180 King street west, Toronto. On site of former building destroyed by fire.

Store and residence to cost $4,000. Architect and builder, W. A. Kirkland, 2132 Queen street E. 2-sty., cement foundation, brick construction. Tenders received by owner.

Victoria, B.C.

Stores and apartments to cost $15,000, Menzies and Niagara streets, for Wm. S. Maner. Architect, S. Maclure, 707½ Fort street, is preparing plans.

Walkerville, Ont.

Factory. The Anthony Fence Company have sold old factory and intend to build new one.

Factory. The American Auto Trimming Co. have purchased more land on which to erect their new building.

Bank, Wyandotte Road, for Merchants Bank of Canada. Architect, Hogle & Davis, 80 St. Francois Xavier street, Montreal. Tenders received at once by J. E. Kinsey. 2-sty., 50 x 50, concrete foundation, brick and terra cotta construction.

Winnipeg, Man.

Office building, Main and Market sts., planned for Scottish Loan Co. Representative, Montagu Black, c/o Robinson & Black, 303 McArthur Bldg. Work of building will start at expiration of present leases.

Addition to factory. The Smart Bagg Co. Ltd., 150 Alexander avenue, intend enlarging their present plant soon. New machinery will be required.

Office building to cost $1,000,000, Rorie and McDermott streets, for Globe Securities, London, Eng. 12-stys. Plans under way.

CONTRACTS AWARDED

Chicoutimi, Que.

Office and residence, cost $8,000, Racine street. Owner and builder, Adelard Tremblay. Three storeys, 50 x 50, brick construction.

Montreal, Que.

Store and residence to cost $5,400, St. Jerome street. Owner and builder, Zoel Martin, 1193 Delorimier. 3-sty., 25 x 50, cement foundation, brick construction.

Store and residence to cost $4,200, St. Lawrence. Owner and builder, F. C. Perrault, 313 St. Lawrence. 3-sty., 25 x 55, cement foundation, brick veneer construction.

Store to cost $4,800, St. Hubert. Owner and builder, Arthur Delmotte, 1567 Chabot street. 3-sty., 25 x 48, stone foundation, brick veneer construction.

Stores to cost $10,000, Victoria and St. Emard Ward. Owner and builder, W. Noel, 115 Victoria and Hertel. General contractor, N. Bresebois. 3-sty., 50 x 65, cement foundation, artificial stone construction.

Moose Jaw, Sask.

Department store, cost $210,000, for Herbert Snell, 52 Main street. Architects, Thomas & Co., 5 Utopia Block. Mech., C. A. P. Turner, Canada Bldg., Winnipeg. General contractors, National Construction Co., Donald Bldg., Winnipeg. Three storeys and basement, 125 x 166.

Warehouse, cost $60,000, Main and Athabasca streets, for Manley Slater Co. Architect, R. G. Bunyard, Bank of Commerce Bldg. General contractor, J. Morgan. Three storeys and basement, 54 x 125.

Garage, cost $30,000, High street east and 10th ave., for Col. G. S. Tuxford. Architect, R. G. Bunyard, Bank of Commerce Bldg. General contractors, National Construction Co., Donald Bldg., Winnipeg. Two storeys, 72 x 75.

New Westminster, B.C.

Warehouse and bunkers to cost $25,000, for The B. C. Transport Co. Engineer in charge, H. C. Brice, West Trust Block. Local representative, E. J. Fader. Warehouse, 1-sty., 40 x 200, bunkers 24 ft. wide x 160 ft. long x 30 ft. high.

Ottawa, Ont.

Compositing building to cost $10,500, McKay street, for Dom. Govt. Topographical Dept. Architect, Pub. Works Dept. General contractor, Chas. Holbrook & Son, 480 McLaren. 17 x 152, brick construction.

Peterboro, Ont.

Chop elevator (extension) for Campbell Flour Mills Co., Cawthra W., Toronto. Architect, Wm. Blackwell, Peterboro. General contractor, M. McIntyre, 443 Mark street. 2-sty., 24 x 24, cement foundation, frame construction.

Grain elevator, George street, for Campbell Flour Mills Co., Cawthra Ave. W., Toronto. Architect, Wm. Blackwell, Water street, Peterboro. General contractor, M. McIntyre, 443 Mark street. 40 x 20, concrete foundation, frame construction, sheeted with No. 26 corrugated steel siding.

St. Catharines, Ont.

Automobile factory for Reo Motor Car Co. Contractors, Newman Bros., 75 St. Paul street. Will require elevator.

Garage to cost $5,000, Queenston St., for Slough & Bush. Architect and contractor, Jno. Davis, 7 Frank street. 2-sty., brick construction.

Bank and office building to cost $65,000, St. Paul street, for Canadian Bank of Commerce. Architect and builder, Dominion Realty Co., King and Jordan streets, Toronto. 3-sty., 36 x 85, stone and brick construction. Foundation started.

St. Thomas, Ont.

Factory to cost $10,000, Curtis street, for St. Thomas Metal Vault Co. Manager, A. J. Stough. Architect, J. J. Finlay. General contractor, A. E. Ponsford. 2-sty., 60 x 150, cement foundation, brick construction.

St. John, N.S.

Dairy and apartments to cost $5,000, Queen street, for Clover Farm Dairy, c/o Louis B. Mabey, Queen street. Architect, Garnet Wilson, Princess street. General contractor, Coleman Mabey, 307 Princess street. 3-sty., 30 x 70, concrete foundation, frame construction.

Store to cost $15,000, Charlotte street, for Estate of Henry Coffee, Rothsay, N. B. Architect, Garnet Wilson, Princess street. General contractor, R. A. Corbett, Douglas avenue. Electric lighting, Hiram Webb & Son, Germain street. 3-sty., 25 x 70.

Remodelling building, Prince William street, for The Standard Ltd. Manager, H. V. McKinnon. Architect, G. E. Fairweather, 84 Germain street. General contractor, A. R. Clark & Son, 51 Water street. Carpenter, Alfred Dodge, 210 King street E. Ptg., heating, plbg., elec. work and contract for 2 large elevators not let yet.

Sarnia, Ont.

Factory for The Regal Fence & Gate Co. Brick and concrete construction. Work being done by day labor.

Toronto, Ont.

4 stores and residence to cost $15,000, 1161-7 Bloor street, for Thos. McLaughlin, 9 Bedford road. Builders, Davis & Moore, 176 St. Clarens avenue. 2-sty., stone foundation, cut stone and brick foundation. Excavating started.

10 stores and apartments to cost $35,000, College street, for Marks & Cohen, 414 Spadina avenue. Architect and builder, Wm. Griffiths, 74 Englewood avenue. 3-sty., brick construction and foundation.

Stores (alterations and addition) to cost $5,000, Church and Wellesly streets, for W. H. Lea, Church and Wellesley street. Builder, S. A. Waggett, 61 Bleeker street. Brick construction.

Store, cost $10,000, Bloor and Brock ave., for H. P. Cranfield, 155 Robert St. Architect, J. H. Stanford, Bloor and Ossington. General contractor, J. J. Miller, 23 Perth ave. Two storeys, 87 x 38, brick construction.

Vancouver, B.C.

Garage to cost $30,000, Georgia street, for A. W. Cruse. Manager, Archibald Auto Co. Architect, Doctor, Stewart & Davie, Arts & Crafts Bldg. General contractor, Robt. McLean & Co., Pacific Bldg. 3-sty., 66 x 90, concrete construction.

Veteran, Sask.

Bank building to cost $6,000 for Bank of Toronto, head office Wellington St. E., Toronto. Architect, G. W. Northwood, 232 Portage avenue, Winnipeg. General contractors, Fisher & Westlin, Veteran.

Walkerville, Ont.

Factory to cost $10,000, for Eastern Dye Works. Architect and general contractor, O. W. Shelly, 1423 Broadway, N.Y. 2-sty., 47 x 195, concrete foundation, brick, steel and wood construction.

Factory extension for the Walkerville Land & Bldg. Co. Architects and general contractors, Wells & Gray, Confederation Life Bldg., Toronto. Plumbing and heating, H. Walker & Sons. Iron work, Canada Bridge Co. Three storeys, concrete and brick construction, concrete foundation.

Windsor, Ont.

Garage, stores, etc., to cost $40,000, Ferry street, for Malcolm McGregor, Detroit. General contractors, Wells & Gray, Walkerville. [illegible]-sty., 100 x 100.

Residences

London, Ont.

Residence to cost $6,000, Wellington and Hyman streets, for I. A. Stevens, St. George Apartments. 2-sty., red pressed brick construction, ornamental stone work. Plans prepared.

Montreal, Que.

Residence to cost $7,200, for Geo. Coutlie, 2219 Gouin avenue. Architect, E. Mongenthale. 2½-sty., 36 x 48, brick construction, cement foundation. Plans ready.

Racing stables and residence, Blue Bonnets, for Sir H. Montagu Allan, 505 Pine avenue W. Modern construction. Plans in progress.

Ottawa, Ont.

Residence to cost $5,200, Thornton. Architect and builder, John Baird, 196 Mutchmore street. 2-sty., stone foundation, double brick veneer construction. Plans in progress.

Residence to cost $9,000, Laurier Ave., for Lt.-Col. Fiset, Wilbrod street. Architect, Jas. Mather, 110 Wellington St. 3-sty., 33 x 62, stone foundation, brick construction. Plans drawn.

Outremont, Que.

Apartment house to cost $75,000, Laurier avenue and De l'Epee street, for Dr. J. A. Handfield, 440 St. Denis street, Montreal. Plans in progress.

St. Andrews, N.B.

Residence to cost $20,000 planned for G. M. Bosworth, Vice-Pres. of C. P. R., 41 Linton Apartments, Montreal, Que. Work will be started as soon as possible.

South Vancouver, B.C.

Apartment house to cost $20,000, Stansby and Vanness streets, for J. H. Engleman, Burrard street. Architect, A. J. Bird, 326 Winch Bldg. 2-sty., frame construction. Plans prepared.

Toronto, Ont.

Residence to cost $4,000, Crown Park road, for T. Hartwick, 80 Waverley Rd. Architect, C. L. Stewart, Stair Bldg. 2-sty. and attic, 26 x 38, brick construction, brick and stucco construction. Plans in progress.

Apartments to cost $8,000, Mountclair avenue, for Mrs. H. Bovell, c/o Bovell & Molesworth. Architects, Bovell & Molesworth, 449 Yonge street. Brick foundation and construction. Tenders called.

Residence to cost $5,800, 250 Garden avenue. Owner and builder, J. G. McConkey, 58 Westminster avenue. 2½-sty., stone foundation, brick construction. Tenders received by owner.

Westmount, Que.

Residence, Belvedere Road, for J. W. Tatley, 63 Belvedere Road. Tenders received by architects, Hutchison, Wood & Miller, 50 Royal Insurance Bldg., Montreal.

Residence, Westmount and Argyle avenues, for D. H. McLennan, 473 Cote St. Antoine road. Tenders received by architect, Robt. Findlay, 10 Phillips Place, Montreal.

Apartment house to cost $40,000, Western and Oliver avenue, for Montreal House Construction Co., 144 Dominion Express Bldg., Montreal. Architect, I. Wechselberger, 30 St. John St., Montreal. 4-sty. and basement, cement foundation, structural steel and reinforced concrete construction. Plans ready.

CONTRACTS AWARDED

Calgary, Alta.

Residence to cost $4,000, Elbow Park. Owner and general contractor, I. G.

(Continued on page 81)

Tenders and For Sale Department

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

Tenders for Motor and Pump

Sealed tenders will be received by the City of St. Boniface, Man., up till **November 8th, 1912,** for the supply and erection of a variable speed motor and a motor-driven pump capable of delivering either 1,000,000 or 1,500,000 imperial gallons per twenty-four hours.

The pump must be capable of delivering either of these quantities against a pressure of 65 lbs. (domestic pressure) and 100 lbs. (fire pressure).

The current supply in pump house is 550 volts, 3-phase, alternating.

Plans showing layout and available space may be obtained at the City Engineer's office.

Each tender must be accompanied by a marked cheque or cash equal to five per cent. of the amount of tender.

The lowest or any tender not necessarily accepted.

Tenders to be addressed to J. B. Cote, City Clerk and marked "Tenders for Motor Driven Pump."

(Signed) J. B. COTE,
City Clerk.

42-43-57

Mail Contract

Sealed tenders, addressed to the Postmaster General, will be received at Ottawa until noon on **Friday, the 15th of November, 1912**, for the conveyance of His Majesty's Mails on a proposed Contract for four years, six round trips per week, on Rural Mail Route from King, Ontario, to commence at the pleasure of the Postmaster General.

Printed notices containing further information as to conditions of proposed Contract may be seen and blank forms of Tender may be obtained at the Post Offices of King, Davis Corners, Eversley, Temperanceville and at the office of the Post Office Inspector at Toronto.

G. C. ANDERSON, Superintendent.

Post Office Department,
Mail Service Branch,
Ottawa, Sept. 30th, 1912.

41-45-45

City of London, Ontario

Tenders for Wharncliffe Road Highway Bridge over Thames River

Sealed proposals, addressed to the "Chairman and Members No. 2 Committee," will be received at the office of the City Clerk until 5 p.m. on **Wednesday, November 13th, 1912**, for constructing and erecting a 270-foot span pin-connected Petit Truss Highway Bridge with necessary approach spans, concrete piers and abutments complete.

Each bidder shall name lump sum for the various parts of the work as described in the general specification and give price for any deductions or additions to the same and make his tender on the form furnished by the City Engineer.

Plans and specifications and form of tender may be seen at and obtained from the office of the City Engineer.

Contractors to enclose a marked cheque for ten per cent. (10 p.c.) of the amount of their bids.

The city reserves the right to reject any or all bids and to accept any bid.

W. E. ROBINSON,
Chairman, No. 2 Committee.

GEO. E. WRIGHT,
City Engineer.

43-45-64

Sealed tenders addressed to the undersigned, and endorsed "Tender for Wharfs and Dredging at Rimouski, Que.," will be received at this office until 4 p.m., on **Tuesday, November 12, 1912**, for the construction of a line of Wharfs and Dredging Tidal Basin at Rimouski, County of Rimouski, Que.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the offices of J. A. Tremblay, Esq., District Engineer, Montmagny, Que.; A. R. Decary, Esq., District Engineer, Post Office Building, Quebec; J. L. Michaud, Esq., District Engineer, Merchants Bank Building, St. James St., Montreal, and on application to the Postmaster at Rimouski, Que.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, Ont., October 14, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—28632.

43-44-65

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. 11-t.f.

Separate sealed tenders, addressed to the undersigned, and endorsed "Tender for Sorting Cases for Post Offices," and "Tender for Rural Mail Sorting Cases for Postal Service," will be received until 4 p.m. on **Wednesday, October 30, 1912**, for the supply of the cases mentioned.

Tenders will not be considered unless made upon forms furnished by Department, and in accordance with conditions contained therein.

Plans and specifications to be seen on application to Mr. T. A. Hastings, Clerk of Works, Postal Station "F," Toronto, Ont., and at the Department of Public Works, Ottawa.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
—28750. Ottawa, October 14, 1912.

43-60

Sealed tenders addressed to the undersigned, and endorsed "Tender for Public Building, Midland, Ont.," will be received at this office until 4 p.m. on **Tuesday, November 5, 1912**, for the work mentioned.

Plans, specification and form of contract can be seen and forms of tender obtained at the office of Mr. Thos. Hastings, Clerk of Works, Postal Station F, Yonge Ctreet, Toronto, at the Post Office Midland, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, October 14, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—28359.

43-44-63

To Architects

Competitive plans for a proposed City Hall at Moose Jaw, Sask., are desired by the City Council. Conditions for this competition may be obtained from the City Clerk, the Secretary of each of the Provincial Associations of Architects, or Mr. F. S. Baker, Traders Bank Building, Toronto. 42-43-56

EXTENSION OF TIME

Notice is hereby given that the time for the reception of tenders for addition and alteration to Public Building, Paris, Ont., is extended to **Monday, November 4, 1912.**

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, October 19, 1912. 43-44-66

Tenders for Drainage Work

Stanley Township

Tenders for Drainage Work (according to By-law No. 11, of 1911) estimated at 30,500 cubic yards, will be received by the undersigned up to **November 29th, 1912.**

All tenders must be accompanied by a marked cheque for ten per cent. of the contract price demanded.

Copies of By-law sent on application.

The lowest or any tender not necessarily accepted.

ROBT. J. RICHARDSON,
Clerk of Stanley Township,
Varna, Ont.
42-44-55

Sealed tenders addressed to the undersigned, and endorsed "Tender for Public Building, Grimsby, Ont.," will be received at this office until 4 p.m., on **Wednesday, October 30, 1912**, for the construction of a Public Building at the place mentioned.

Plans, specification and form of contract can be seen and forms of tender obtained at the Independent newspaper office, Grimsby, Ontario, at the Post Office, St. Catharines, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, October 2, 1912.

Newspapers will not be paid if this advertisement is inserted without the authority of the Department. 27881. 43-61

For Sale

Stone crusher, portable, with elevator. Also 16 h.p. gas engine, portable. Enquire Box 626, Contract Record, Toronto, Ont. 42-T.F.-58

Agents Wanted

Large United States manufacturer desires to appoint agencies in Canadian territories, where not already represented, for the best line of Concrete Waterproofing coatings made. Attractive proposition. Box 621, Contract Record, Toronto, Ont. 42-53 T.F.

Residences

(Continued from page 79)

Whitehair, Box 1254. 2-sty., 25 x 30, frame, cement foundation.

Residence to cost $6,000, Rose Hall. Architect and builder, H. A. Christenson, 3207 Elgin avenue. 2-sty., 28 x 30, cement foundation, brick construction. Excavation started.

Residence to cost $4,500, Upper Hillhurst. Owner and general contractor, G. W. Christie, 411 11½ street N.W. 2-sty., 31 x 33, cement foundation, brick construction.

Residence to cost $7,000, Mt. Royal, for D. G. Stewart. Builders, Alliance Investment Co., 711 1st St. W. 2½-sty., 47 ft. 2 in. x 26 ft. 8 in., cement foundation, brick construction. Excavating started.

Residence to cost $4,500, Elbow Park. Owners and builders, Kennedy & Payne, 7 Belmont Block. 2-sty., 28 x 50, frame, cement foundation.

Craigie Lea, Ont.

Residence to cost $9,000, for W. H. White, Buffalo, N.Y. Architect and general contractor, James Waters, Craigie Lea. 3-sty., 80 x 30, 20 x 2, stone foundation, stone and brick construction.

Hamilton, Ont.

Residence to cost $4,000, Sherman, for P. G. Colvin, 11 Slater street. Architect and mason, Sparks & McKay, 83 Fairhold road. Roofing, Havers Bros., 43 McNab street N. Ptg., R. Dow, 15 Bay street N. Plmg., J. E. Gibson, 708 King street E. Electric work, L. H. Lander, 110 King street W. Stone foundation, pressed brick construction.

Residence to cost $6,000, Ancaster, for F. H. Whitton, 353 Bay street S. Architects, Mills & Hutton, Bank of Hamilton Bldg. General contractor, Geo. R. Patterson, 265 Charlton avenue W. 2½-sty., 46 ft. 6 in. x 34 ft. 3 in., frame and stucco construction.

Apartments to cost $15,000, Bold St., for J. C. Sealey, 187 Bold street. Architect, Watt & Blackwell, Lister Bldg. General contractor, R. Tope. 2-sty. and basement, brick.

Montreal, Que.

Residence to cost $5,000, Chateaubriand. Owner and builder, Nap. D. Leger, 906 Villeray. 3-sty., 50 x 58, cement foundation, pressed brick construction.

Residence to cost $7,200, De Gaspe, for Jos. Riopel, 2811 St. Lawrence. General contractor, J. H. Blain. 3-sty., 50 x 45, stone foundation, brick construction.

2 cottages to cost $9,000, 215 Beaconsfield avenue, for Maple Leaf Realty Co., 513 Merchants Bank Bldg. Architect, C. A. Mitchell, 58 Beaver Hall Hill. General contractor, Ed. J. Lynch, 31 Milton street. 2-sty., 21 x 38 each, cement foundation, brick construction.

Residence to cost $4,200, Cartier. Owner and builder, R. Morris, 167 Cartier. 3-sty., 25 x 40, cement foundation, brick veneer construction.

Flats to cost $8,700, Davidson, for Jos. Larzon, 213 Davidson. Builder, Telesphore Pageaus, 408 St. Germain. 3-sty., 50 x 45, Roman stone construction, cement foundation. Excavation started.

Residence to cost $4,300, De la Roche. Owner and builder, A. S. Trudel, 1792 De la Roche. 3-sty., 25 x 38, Roman stone construction, cement foundation.

Residence to cost $7,200, Mance, for Jos. Ladouceur, 1930 Mance. Architect, J. A. Ouellet, 250 Amherst. General contractor, M. Bettanay. 3-sty., 25 x 96, brick and stone construction, stone foundation.

Residence to cost $5,400, Mentana, for Dame Laurie Laniel, c/o owner. Builder, A. Guilbault Fils, c/o owner. 3-sty., 35 x 42, cement foundation, brick veneer construction.

Residence to cost $4,200, Drolet street. Owner and builder, J. Wallace, 2934 Drolet street. 2-sty., 25 x 35, cement foundation, brick construction.

Residence to cost $4,150, 7th avenue, for J. B. Pelletier, 377 17th avenue. Builder, C. A. Gaudry, 391 6th avenue, Rosemount. 2-sty., 25 x 31, brick.

Residence to cost $4,200, Holt street. Owner and builder, Eugene Noel, 1023 Marieanne. 2-sty., 24 x 35, cement foundation, brick construction.

Residence to cost $4,100, Chateaubriand. Owner and builder, Philippe Vermotte, 618 Huntley. 3-sty., 25 x 42, stone foundation, pressed brick construction.

Residence, St. Hubert street. Owner and builder, Amedee Payette, 1306 Marieanne. 3-sty., 25 x 50, cement foundation, brick veneer construction. Foundation in.

Residence to cost $1,200, Iberville. Owner and builder, Jos. M. Brouillette, 760 Frontenac. 2-sty., 25 x 35, stone foundation, pressed brick construction. Excavation started.

Residence to cost $1,100, Dufferin. Owner and builder, Jos. Ouimet, 753 Laval avenue. 3-sty., 25 x 35, cement foundation, brick construction. Excavation started.

Ottawa, Ont.

Residence to cost $1,000. Architect and builder, Thos. Gordon, 15 Rupert street. 2-sty., 32 x 42, double brick veneer.

Residence to cost $1,500, Cartier St., for Frank Bessonett. Builder, A. W. Clark, 113 Hawthorne. 23 x 50, stone foundation, brick veneer construction.

Residence to cost $11,500, Laurier avenue. Architect and builder, D. L. Beaudit, 555½ St. Patrick. 3-sty., stone foundation, solid brick construction. Plans ready.

Residences to cost $8,000, Metcalfe. Architect and builder, Thos. Carey, 111 Centre street. 4 in row tenement houses, stone, brick veneer construction.

Outremont, Que.

2 cottages, cor. St. Viateur & Burnard street. Owner and general con

tractor, The Clercs de St. Viateur, St. Viateur street W., and Durocher street. 2-sty., 36 ft ornamental iron railing and gates. Stables and kitchen in rear.

Point Grey, B.C.

Residence to cost $20,000, for W. A. Bauer, 744 Hastings W., Vancouver. Architects, Somervell & Putman, 744 Hastings W., Vancouver. General contractor, M. Arvensen, 205 Cortton Bldg., Vancouver. 2-sty., frame construction.

Residence to cost $7,000, for Rev. J. Briggs. General contractors, W. Tinney & Co., 429 Pender street W., Vancouver. 2-sty., frame construction.

Residence to cost $10,000, Cedar and Cypress streets, for A. P. Bogardus, 784 Thurlow street, Vancouver. General contractor, A. Williams, 509 Metropolitan Bldg., Vancouver. 2-sty., frame construction.

Residence, cost $10,000, for T. D. Mitchell. Architect, A. C. Hope, 603 Hastings street west, Vancouver. General contractors, Howland & Hewitt, 1222 Melville street. Two storeys, frame construction.

Toronto, Ont.

Residence to cost $3,800, for Rev. V. E. F. Morgan, 36 Benlomand avenue. Builder, W. H. Lee, 112 Hannaford St. Stone foundation, frame and stucco construction.

2 residences to cost $7,200, 81 Salem avenue, for J. H. McComb, 543 Gladstone avenue. Builder, T. Crouch & Co., 911 Dovercourt road. Brick, stone foundation.

2 detached residences to cost $6,400. Architect and builder, R. C. Vaughan & Son, 22 Summerhill Gardens. 2½-sty., brick construction, brick foundation.

Residence to cost $4,500. Owner and builder, A. E. Armstrong, 61 Farnham avenue. 2½-sty., brick foundation and construction.

1 detached residence to cost $4,500, Indian and Grenadier roads. Owner, architect and builder, F. A. Ransome, 169 Grenadier road. Brick.

1 detached residence to cost $5,000, Spadina road. Owner and builder, W. J. O'Reilly, 52 Colborne street. Brick. Plans prepared.

2 detached residences to cost $10,000. Architect and builder, G. Reid, 34 Sinclair avenue. 2½-sty., brick, stone foundation, concrete. Plans drawn.

Residence to cost $8,000 for A. B. Barker, Bank of Toronto Bldg., Wellington. Architects, Chadwick & Beckett, 18 Toronto street. Builder, Edwin White, 15 Bleecker. Brick foundation, brick and cut stone construction.

Residence to cost $4,100, Lakefront Munroe Park, for J. H. Curran, 2260 Queen E. Builders, Geisel & Gelding, 70 Bellfair avenue. 2½-sty., cement foundation, brick construction.

Residence and garage to cost $4,500, Heath and Alvin avenue. Owner and builder, P. W. Coltman, 167 Robert St. Architect, J. G. Hedges, 84 Yonge St. 2½-sty., stone foundation, brick construction.

Vancouver, B.C.

Residence to cost $10,000, Shaughnessy Heights, for Geo. Hunter, 1206 Pacific. Architects, Grant, Henderson & Cook, Williams Bldg. General contractor, Mr. Schuler, c/o architect. Frame construction, concrete foundation.

Apartment house, cost $25,000, 700 Blk. Powell street, for Mrs. Mabel Langley. Architect, J. Dawson, Holden Bldg. General contractors, Pinner & McLellan, 629 Cambie street. Heating and plumbing, Barr & Anderson, 1060 Homer St. Three storeys, brick and mill construction.

Walkerville, Ont.

Terraces, Monmouth road, for Walkerville Land & Building Co. Architect, Stahl & Kinsey. General contractor, Walker Sons. Mason, H. Howe. Ptg. and glazing, H. D. White. Plmg. and heating, Walkerville Hardware Co. Iron work, Canada Bridge Co. 1-sty., 40 x 120, cement foundation, brick construction.

Residence to cost $4,000, for Sterling Johnston. Mason, H. Wilson, Goyeau street, Windsor. Iron work, Canada Bridge Co. 2-sty., 28 x 32, brick foundation, brick veneer construction.

Alterations and addition to residence, cost $5,000, for U. Scarth Stevenson, 355 Olivier ave. Architect, P. J. Turner, 116 Board of Trade, Montreal. General contractors, Bonnell Bros., 341 Guy St., Montreal.

Windsor, Ont.

Residence, cost $3,500, Gladstone ave., for F. Nevin. Mason, H. Wilson, Goyeau street. Carpentry and roofing, Gray & Abbott, Walkerville. Plumbing and glazing, C. M. Bennett. Iron work, Canada Bridge Co., Two storeys, 32 x 34, tile and brick construction.

Winnipeg, Man.

Residence, cost $8,000, McMillan St. Owner and builder, J. C. Fitzgerald, 511 Beresford ave. 2½ storeys, 31 x 31, frame and stucco.

Four residences, cost $15,200, Lifton street. General contractor and owner, Thorsteinsson Bros., P. O. Box 2035. Two storeys, 20 x 28, cement foundation, frame construction.

Four residences, cost $14,400. Owner and general contractor, B. Bjornson, Winnipeg. 2-stys., 20x26, cement fndn., frame construction.

Two residences, cost $17,200, Kingsway street. Owner and general contractors, Andrews & Sons, Portage and Victoria street. Two storeys, 32 x 32, cement foundation, frame construction.

Power Plants, Electricity and Telephones

Byron, Ont.

Extension to the Byron Rural Telephone Co. Manager, C. W. Baker. Company will extend system several miles and install large number of new phones.

Duncans, B.C.

Electric lighting system, cost $9,500. Consulting engineers, Dutcher, Maxwell & Co., Rogers Bldg., Vancouver. General contractor, C. H. E. Williams, 615 Pender street west, Vancouver. Mr. Williams will receive tenders for twelve tons 4 and 6 weatherproof copper wire and quantity of line material.

Glencoe, Ont.

The council will at once take up the matter of having extensive repairs made to the electric lighting plant. Considerable new equipment will be required to put it in good running order. Clerk, Geo. Wilson.

Hanley, Sask.

By-law passed authorizing council to raise cost of erection and equipment of electric light plant. Clerk, A. Holm,

Harriston, Ont.

Electric lighting plant, cost $11,000, By-law passed and complete new equipment will be required.

Ingersoll, Ont.

Extension to street lighting system. Commissioners, Mills, Manager and Mayor Coleridge will report on matter of installing large number of additional street lights.

Parkhill, Ont.

Pole line for Municipalities of Parkhill and Lucan. Clerk, J. H. Laughton Will take up matter of building pole line from St. Mary's through Granton & Lucan to Parkhill with Hydro-electric Commissioners.

Quebec, Que.

Power house, cost $35,000, for Dorchester Electric Co., Crown street. Engineers, Byers & Anglin, 65 Victoria St., Montreal. Foundation, The MacArthur Concrete Pile and Foundation Co., 11 Pine street, New York, N.Y.

Rosetown, Sask.

Electric lighting system. By-law will be submitted October 31st to provide for above installation. Secretary-treasurer, S. B. Robinson.

St. Mary's, Ont.

The Town Council will purchase additional electric equipment for installing Hydro in a large number of houses. The purchase of a number of ammeters has been authorized. Superintendent Miller in charge of all work. Secretary, Thos. M. Clark.

Winnipeg, Man.

The city council plans to place ornamental street-lights on Donald and Edmonton streets at a cost of $6,000. C. J. Brown, Clerk.

Miscellaneous

Eastview, Ont.

Fire apparatus. Fire Department has been reorganized and Council will purchase chemical truck, chemical extinguisher, hose and other equipment.

Ottawa, Ont.

Motor fire apparatus, cost $6,000, planned by Board of Control. Secretary, J. Henderson. Fire Chief Graham.

Business Notes

Cookshire, Que.

Sash and door factory of Black & Flaws burned. Will rebuild. Complete plant required. Concrete and brick construction.

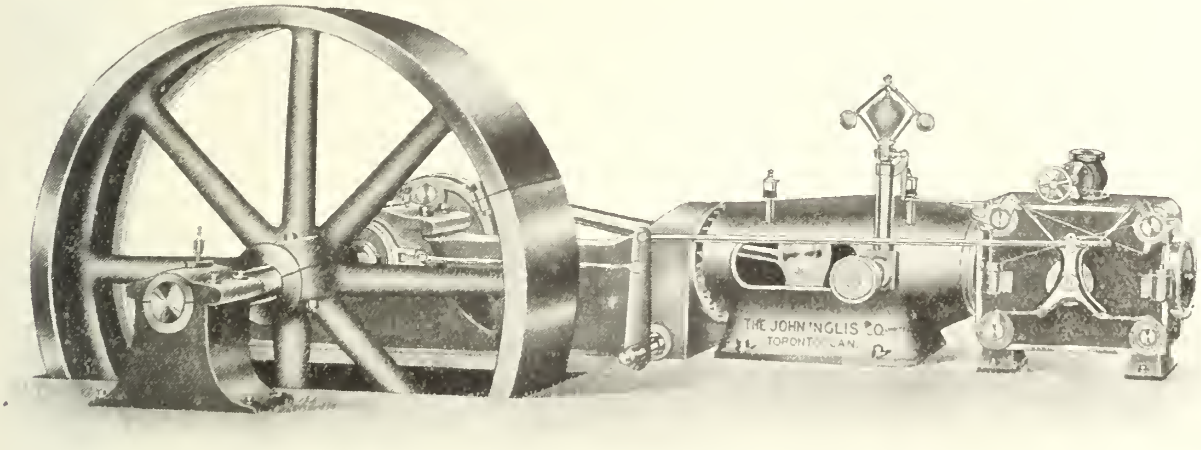
D'Israeli, Que.

Factory of the D'Israeli Box Company totally destroyed by fire. Loss $60,000.

Erieau, Ont.

Bungalow Hotel of the Pere Marquette Railway burned, loss $10,000. A new, larger and better equipped hotel will be rebuilt. Full particulars from the Pere Marquette Superintendent at St. Thomas.

EFFICIENCY CORLISS ENGINES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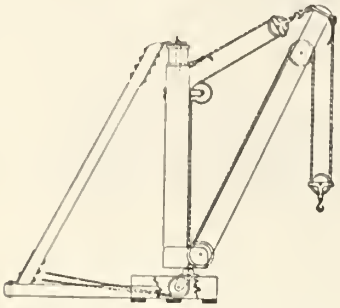

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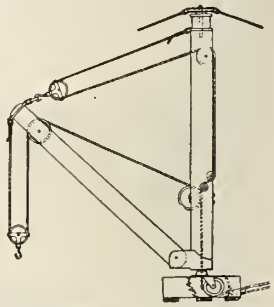

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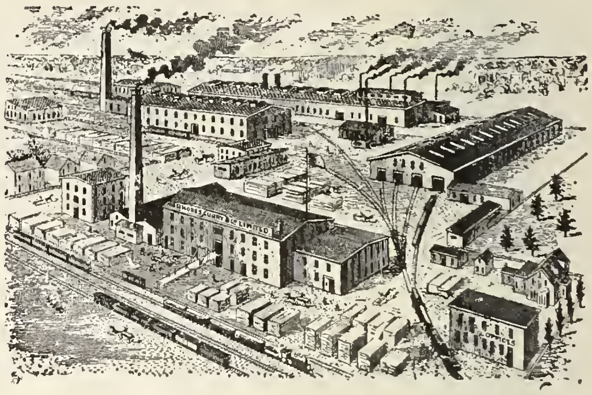

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1—Buckeye Trench Machine, cuts trench 27"x 10'
1—Buckeye Trench Machine, cuts trench 24" & 30" x 12'
1—Parson Trench Machine, cuts trench 28" to 60" x 20'
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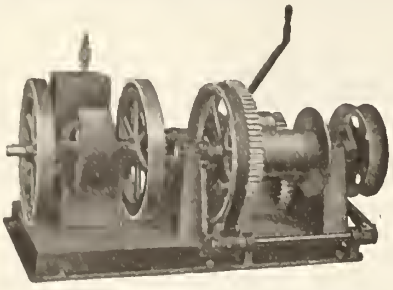

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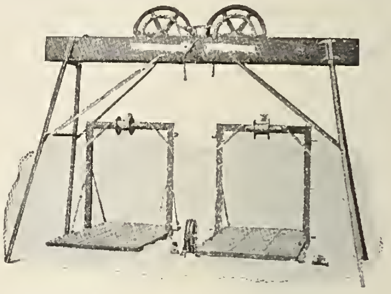

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Builders' Architectural Drawing Self-Taught, by Fred T. Hodgson. Published in 1904 by Frederick J. Drake & Co., Chicago. 262 pages, illustrated. Price 50c.

Architectural Hardwood Finishing, by George Whigelt. Published in 1906 by The Painters Magazine, New York. 124 pages. Price 50c.

Modern Workshop Hints, by Robert Grimshaw, M.E. Published in 1902 by Sampson Low, Marston & Company, London, Eng. 428 pages, illustrated. Price 50c.

Practical House Framing, by Albert Fair. Published in 1909 by Industrial Book Company, New York. 108 pages, illustrated. Price 50c.

Hints for Carpenters, by Albert Fair. Published in 1909 by the Industrial Book Company, New York. 144 pages, illustrated. Price 50c.

Architect, Owner and Builder Before the Law, by T. M. Clark. Publisted in 1905 by The MacMillan Company, New York. 387 pages. Price $1.00,

Properties of Steel Sections, by John C. Sample, C.E. Published in 1905 by McGaw Publishing Company, New York. 121 pages, illustrated. Price 50c.

American Renaissance (A Review of Domestic Architecture), by Joy Wheeler Dow. Published in 1904 by William T. Comstock, New York. 182 pages, illustrated. Price $1.00.

Modern Plumbing, illustrated, by R. M. Starbuck. Published in 1907 by Norman W. Henley Publishing Company, New York. 329 pages, illustrated. Price $2.00.

Reinforced Concrete, by A. W. Buel. Published in 1906 by the Engineering News Publishing Company, New York. 500 pages, illustrated. Price $1.00.

Practical Hand Book for Millwrights, by Calvin F. Swingle, M.E. Published in 1910 by F. J. Drake & Company, Chicago. 426 pages, illustrated. Price 50c.

Resistance of Materials, by N. de Tedasco and A. Maurel. Published in French, in 1911. 650 pages. Price $1.00.

The Sanitation of a Country House, by Dr. Harvey A Bashore. Published in 1905 by John Wiley & Sons, New York. 98 pages, illustrated. Price 50c.

Modern Cement Sidewalk Construction, by Charles Palliser Pub. B. T. Batsford, London. 776 pages, illustrated Price 50c

Stones for Building and Decoration, by George P. Merrill. Published in 1903 by John Wiley & Sons, New York. 540 pages, illustrated. Price 50c.

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Light & Heavy Timber Framing Made Easy, by Fred T. Hodgson Published in 1909 by Frederick J. Drake & Company, Chicago 396 pages, illustrated. Price 50c.

Building Construction & Superintendence, by F. E. Kidder, C.E., Ph.D. Published in 1906 by William T. Comstock. 298 pages, illustrated. Price $1.00.

Modern Baths and Bath Houses, by William Paul Gerhard, C.E Published in 1908 by John Wiley & Sons, New York. 312 pages, illustrated. Price $1.00.

Reinforced Concrete A Manual of Practice, by Ernest McCullough, C.E. Published in 1908 by Cement Era Publishing Company 126 pages, illustrated. Price 50c.

A Practical Treatise on the Steel Square, by Fred T Hodgson Published in 1904 by Frederick J Drake & Company, Chicago 222 pages, illustrated. Price 50c.

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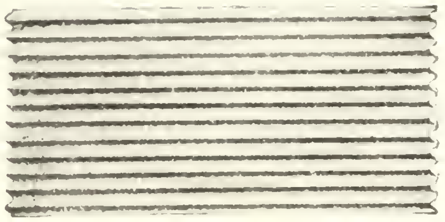

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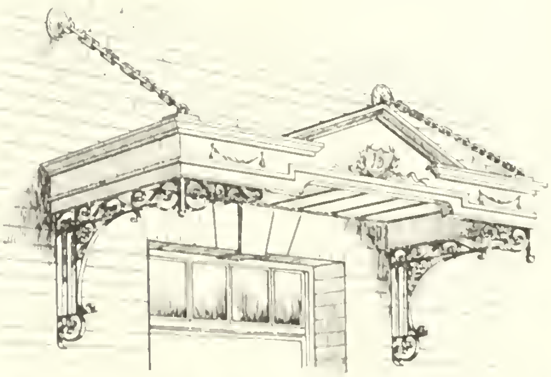

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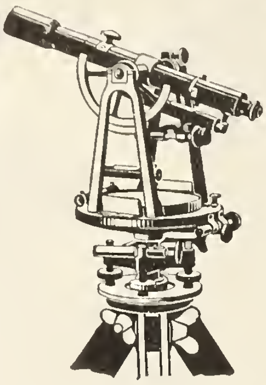

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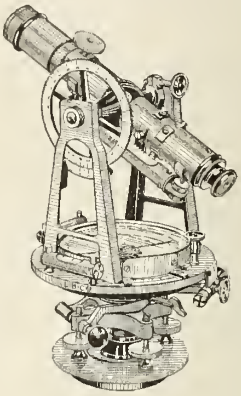

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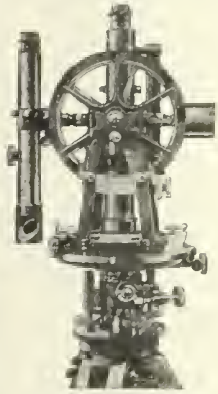

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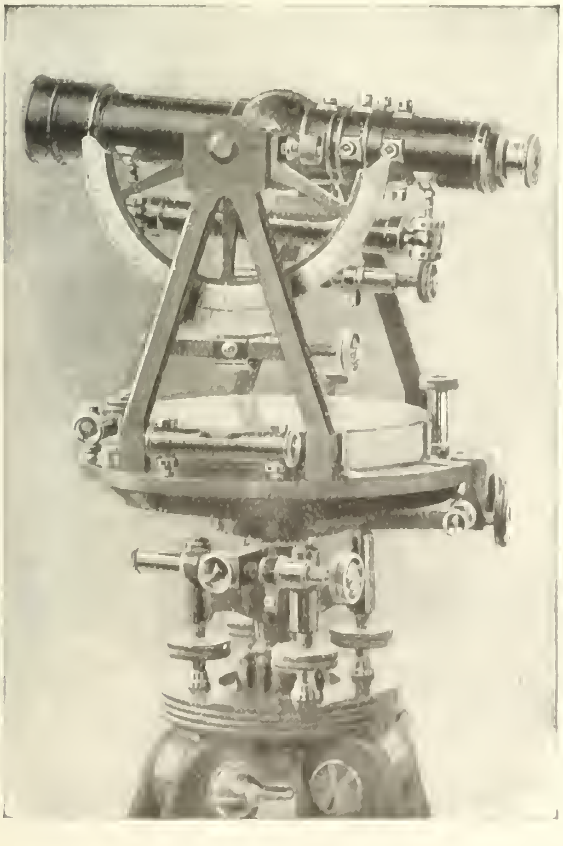

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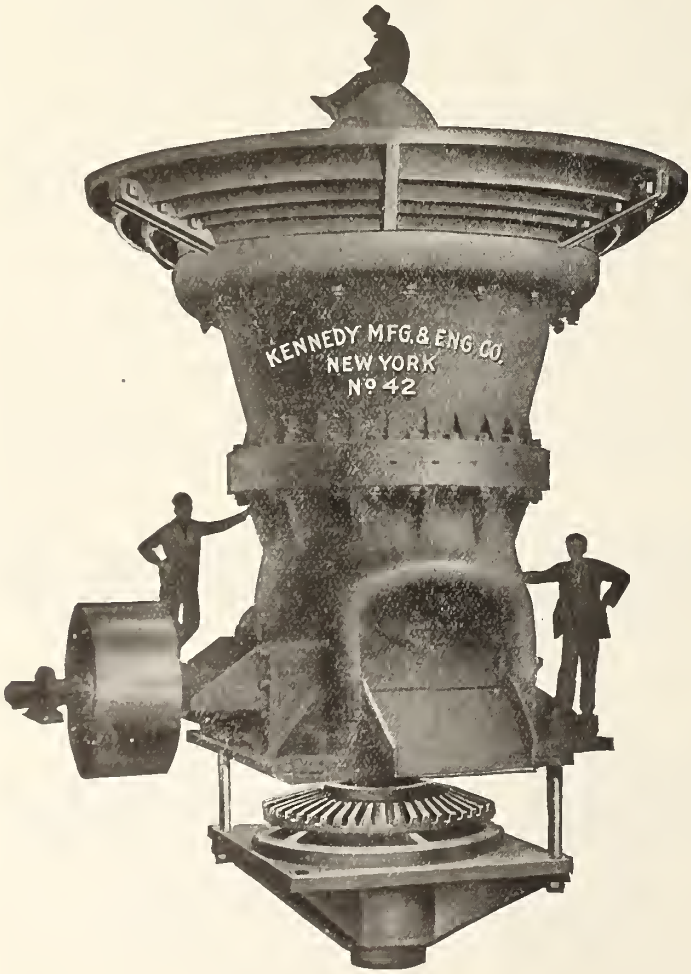

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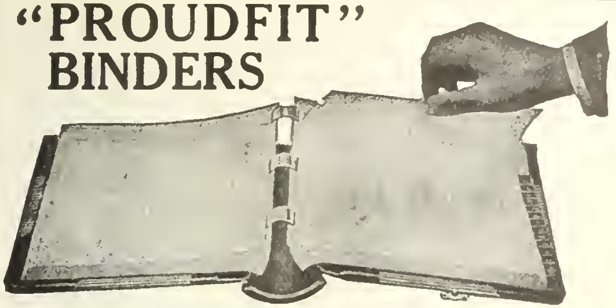

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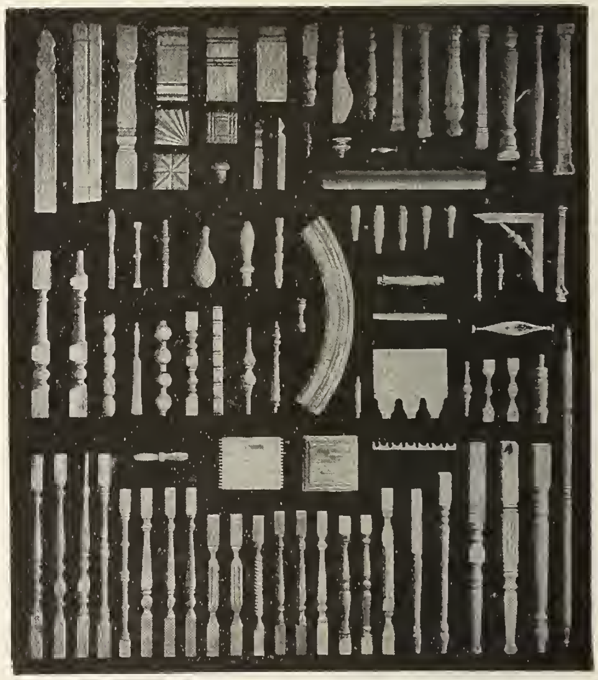

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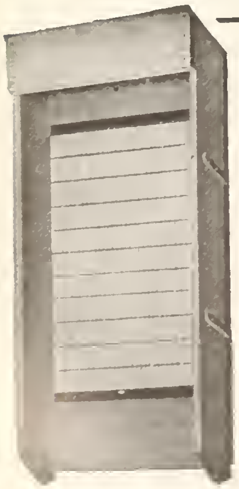

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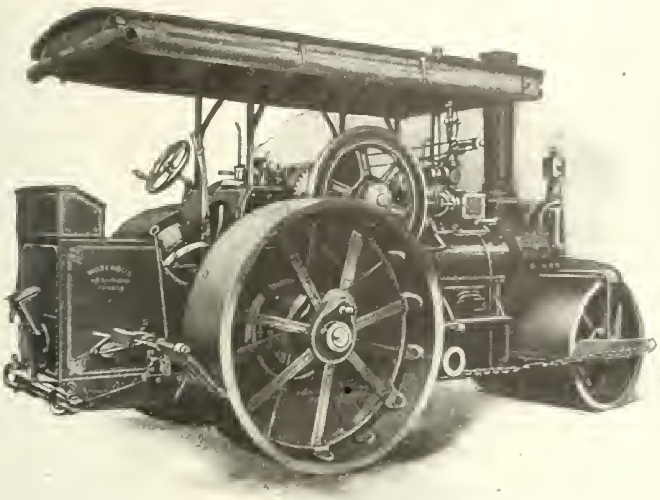

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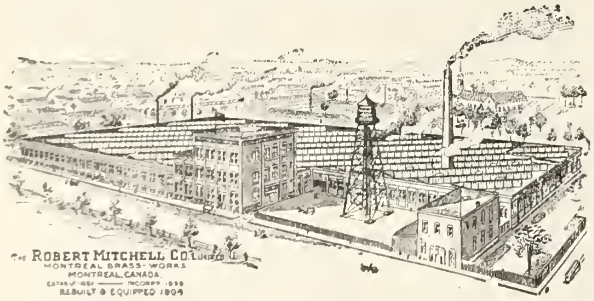
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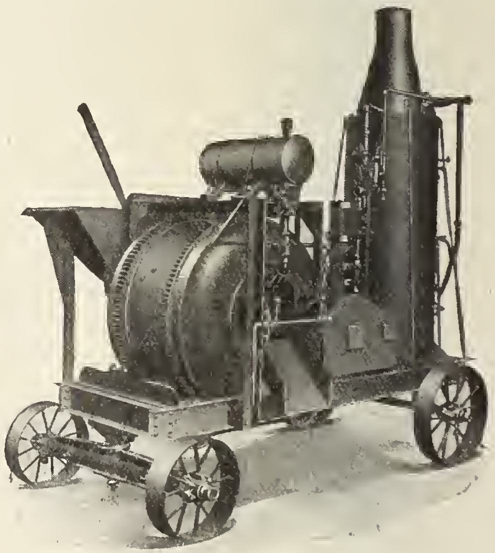

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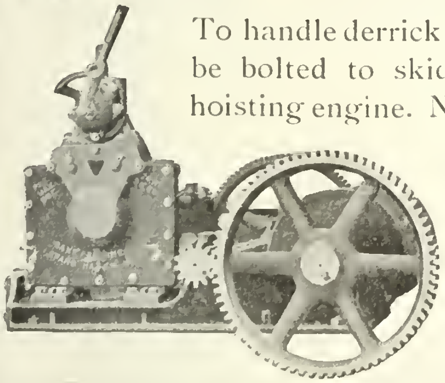

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Contracts taken in any part of Canada. Several years experience in Artesian Wells for Municipal Water Works. Estimates or geological information cheerfully furnished.
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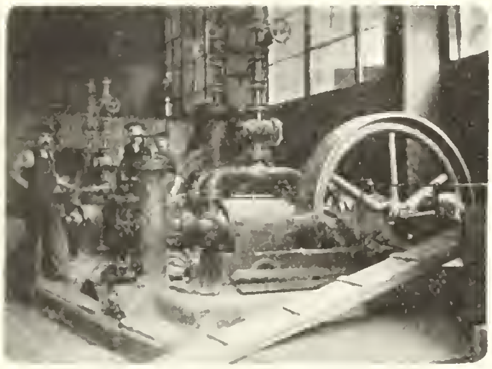

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Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete.

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

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Practical Cost Data on

Herringbone Metal Lath

The ceiling of the Power House of the Toronto General Hospital measures one hundred and twenty yards net. One hundred and twenty-two yards of **Herringbone Lath** covered it completely, waste and lap included.

This is not a record; it is a typical case. The Herringbone selvage edge is the reason.

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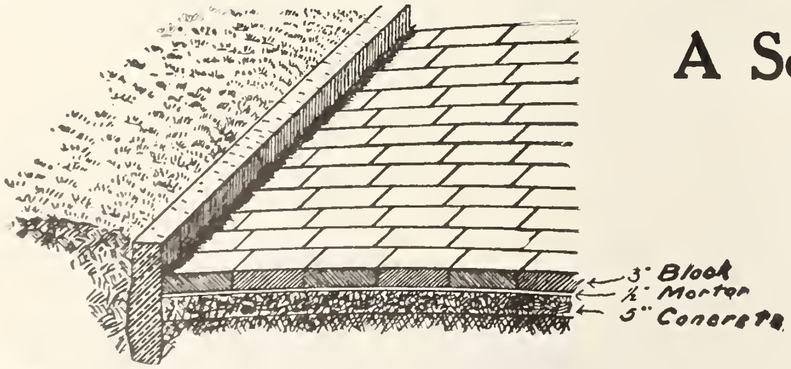

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Durable and Non-Abrasive.
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These requirements are met by
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A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

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The Blystone Mounted Mixer with Power

You will do your concrete mixing quicker and cheaper with the Blystone Mixer. This is not what we alone say but what all users say. This mixer is adaptable to all kinds of work. We are willing to prove its advantages to you—give us the opportunity.

Simple, Durable and ALWAYS READY

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The Blystone Machinery Company
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Specify a roofing that will last a life time without paint or repairs—one that is easily laid, attractive, light weight, yet the toughest and most durable roofing made."

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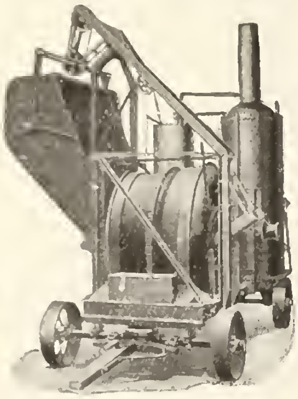
Chain Belt Mixer

just what he thinks of it.

IN MILWAUKEE there were about twenty concrete mixers sold in 1911, and fourteen were **Chain Belts.** Six of the leading concrete mixer concerns have their plants in Milwaukee. Draw your own conclusions, Mr. Contractor.



"The Mixer With the Bulge"

Where there is big construction work you will generally find a **Chain Belt Mixer** on the job. You owe it to yourself to investigate the **Chain Belt** before placing your order.

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Chain Belt Co

Milwaukee, Wis.

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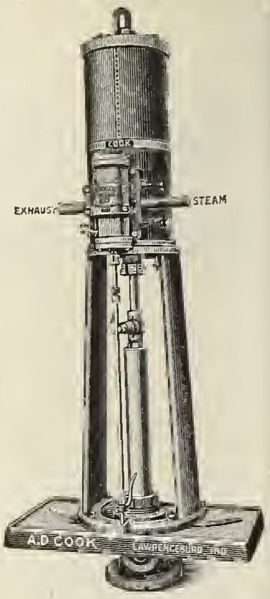

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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per M
No. 1 dry pressed red brick	$18 00
No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	11 00
Wire cut bricks for foundation work	11 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

LUMBER (Building Material)

Hemlock Lumber—		
2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00
Pine—		
1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pnie Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	
Pine trim for paint finish—		
4 in. casing per 100 ft.	2 00	
5 in. casing per 100 ft.	2 25	
8 in. pine base, per 100 ft.	3 25	
10 in. pine base, per 100 ft.	4 25	
4 in. pine window stool	2 75	
Shingles—		
XXX B. C. Clear Shingles, per M.	3 60	
N. B. Extras	3 50	
N. B. Clears	2 90	
No. 1 pine lath, per M.	4 75	
No. 2 pine lath	4 25	
No. 1 spruce lath	4 00	
Cedar Posts—Fence—		
5 in. at small end, each	25	
7 in. at small end, each	35	
Hemlock lath	3 25	

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 per cent, for approved specifications:—

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24.00
106 to 110 "		27 50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D
25	$3 25	$4 75
40	3 45	5 20
50	3 85	6.00
60	4 10	6.50
70	4 35	7.00
80	4.85	7.50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4 75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 per cent.

High grade compression work, 55 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.50

Square head brass cocks, 70 per cent.

Lead Pipe

Lead pipe, $7.50 net; lead waste, $9.25 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$1.93	¼ inch	$2.75
⅜ "	1.93	⅜ "	2.75
½ "	2.55	½ "	3.49
¾ "	2.99	¾ "	4.14
1 "	4.29	1 "	5.94
1¼ "	5.85	1¼ "	8.10
1½ "	7.02	1½ "	9.72
2 "	8.82	2 "	12.42
2½ "	14.09	2½ "	19.84
3 "	18.50	3 "	26.05

Malleable fittings—Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 70; nipples, 4-inch diameter and under, 80; nipples, 4½ inch and up, 75; malleable lipped unions, 65 and 10 per cent.

Plain steel bars, $2.05.

Square twisted bars, ¼ to 1¼, $2.15

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 70 per cent

7 and 8-inch pipe, 50 per cent

Sewer Pipes

4 in.	25c ft	15 in	1 35 ft
6 in.	40c ft	18 in.	1.90 ft
9 in.	65c ft	20 in	2.25 ft
12 in	1.00 ft	24 in	3 25 ft

all less 60 per cent

CEMENT, STONE, STEEL, Etc

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1 80

Cement, wholesale car lots f.o.b. Toronto, bags extra, $1 55

Crushed stone, 2 inch, $1 30, 1 inch, $1 35; [illegible] inch, $1 45

Binder stone, $1 30 per ton, f.o.b. Toronto

Burnt River rubble stone delivered, $15 to $16 per toise

Free stone delivered, $15 to $16 per toise

Brown coursing stone, delivered, $3 25 to $3 50 per yard

Grey coursing stone, delivered, $2 25 to $2 50 per yard

Sand, for cement or brick work, $1 15 a yard, f.o.b. cars, Toronto siding

Brown sills and heads, in the rough, delivered, 40 cents per foot

Rubble stone in car lots, $1 30 per ton

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, 9.00 in car lots.

Lime, per cwt., delivered, not less than 1,500 lbs., 33 cents; white, 43 cents.

Plaster of Paris, Anihor Brand, $1.50.

Manilla Rope, best, per pound, 12½ cents.

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Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turn over buckets, two (2) marine engines, boilers-fuel lighter with whirley aboard. Address,

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Cement Sidewalk Tools

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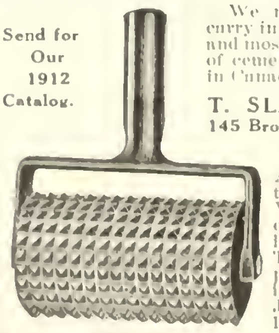

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to give fresh, artistic coloring effects and to wear as long as any colors can; to preserve the shingles thoroughly (Creosote) and not turn black or wash off. Every gallon guaranteed.

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Steel Curb, Curb and Gutter, Crosswalk, Sidewalk and Driveway Forms for Concrete street work.

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LAP WELDED STEEL PIPE

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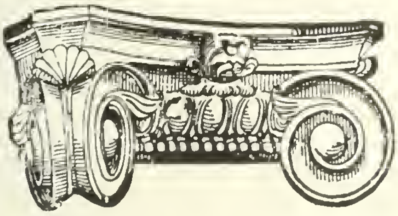

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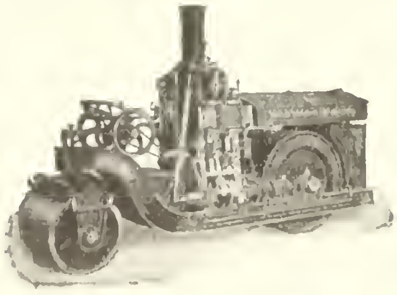

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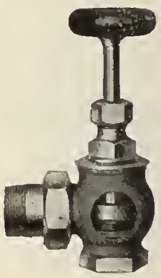

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Always specify KERR.

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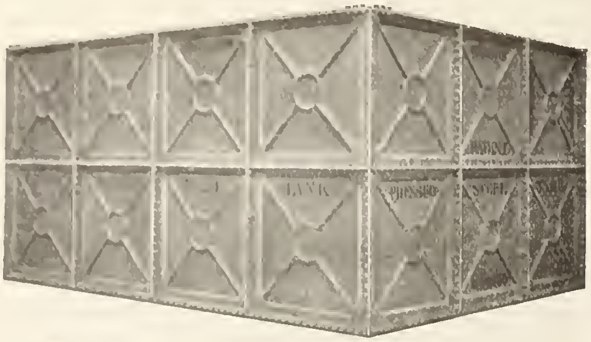

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IMMEDIATE DELIVERY FROM STOCK.

STEEL PIPES—Welded or Rivetted

of any diameter over 12 inches and having any desired type of joint.

Thomas Piggott & Co., Ltd.

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will give you better satisfaction for less money than any other preparations on the market. They are being used by most of the large horse owners throughout Canada—particularly by the Lumbermen and Railway Contractors.

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1 gal. jugs (Imperial)	$4.50 gal.
1 lb. bottles	8.00 doz.
2 lb. bottles	15.00

Positively the best all round Horse Liniment made.

Johnson's Horse Liniment, No. 2 (an oil liniment)

1 gal. jugs (Imperial)	3.00 gal.
1 lb. bottles	6.00 doz.
2 lb. bottles	11.00 doz.

Johnson's Horse Colic Remedy

A sure and speedy cure for all kinds of Colic

1 gal. jugs (Imperial) 40 doses	5.00 gal.
1 lb. bottles 4 doses	8.00 doz.
2 lb. bottles 8 doses	15.00 doz.

Johnson's Veterinary Healing Ointment (Gall Cure)

2 lb. tins	2.00 per tin
4 oz. tins	3.50 doz.

Johnson's Condition Powders (Concentrated)

1 lb. packages	3.60 doz.

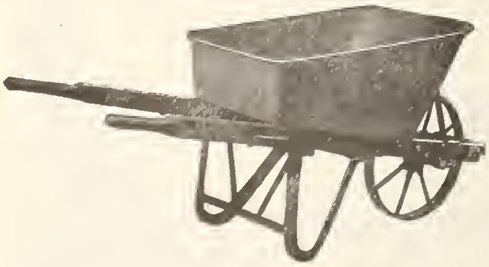
A full supply of all drugs and patent medicines at lowest wholesale prices.

Have you ever used for your men

Johnson's Mosquito Oil 1.75 doz., 18.00 per gross
It positively does the trick

Our prices are lower than those of all other manufacturers. Letter orders receive prompt attention.

A. H. Johnson, Wholesale Druggist, Collingwood, Ont.



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OF ALL DESCRIPTIONS

Are you satisfied with your wheelbarrows, if not you can purchase the "Bull Frog" brand from Dominion Equipment Co. of Winnipeg, and A. J. Brown-Jamison Co., of Vancouver, and be assured of satisfaction.

THE TOLEDO WHEELBARROW COMPANY, TOLEDO, O., U.S.A.

The Luxfer System Saves Its Cost

After installation Luxfer costs nothing. It saves its cost in artificial lighting bills alone. It makes merchandising more satisfactory to both storekeeper and customer. After all, merchants know that a big business cannot be done in dark premises. The architect or builder who specifies Luxfer wins the respect and confidence of his clients, because it is invariably satisfactory.

Specify more than just Prisms,
make it "LUXFER Prisms."

LUXFER PRISM COMPANY, LIMITED
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The Mushroom System

is the Modern Method of Reinforced Concrete Construction for Bridges and Buildings

ELIMINATION OF BEAMS means money saved for owner and builder.

THE COST OF CENTERING is greatly reduced due to saving in Beam Framing.

STOREY HEIGHTS are reduced one or two feet per storey, saving in Brick Walls.

DISTRIBUTION OF THE METAL in Mushroom System Slabs gives the greatest efficiency.

The system is fully covered by broad patents in Canada, the United States, and all civilized foreign countries.

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Dehydratine No. 1—A damp-proofing agent applied to inner walls—a furring substitute.

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Dehydratine Mastixement—A bituminous material used as a binder for Minerva Irish Felt.

Minerva Irish Felt—Considered by Engineers the best waterproofing medium in foundation work where pressures are to be met.

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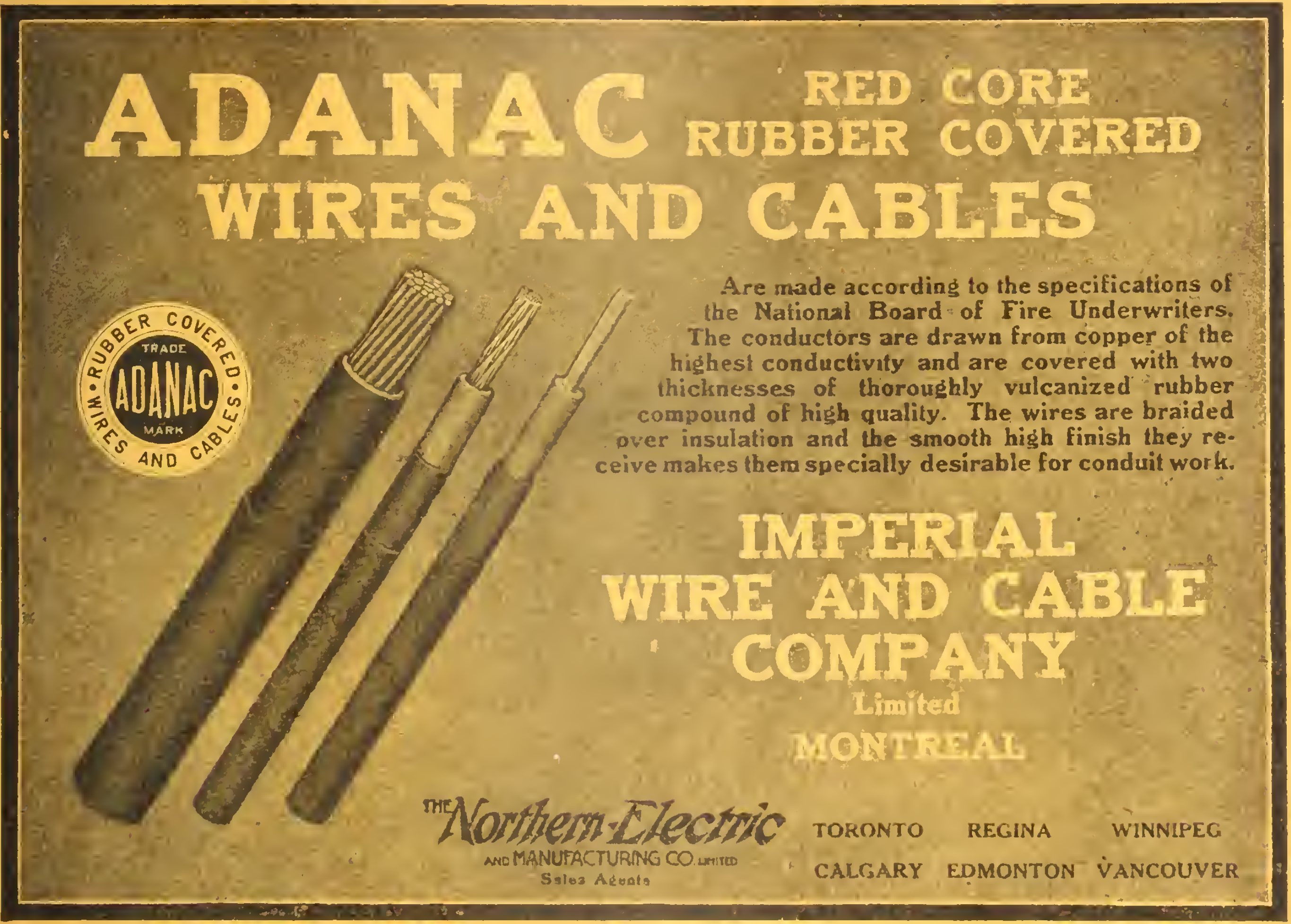

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Are made according to the specifications of the National Board of Fire Underwriters. The conductors are drawn from copper of the highest conductivity and are covered with two thicknesses of thoroughly vulcanized rubber compound of high quality. The wires are braided over insulation and the smooth high finish they receive makes them specially desirable for conduit work.

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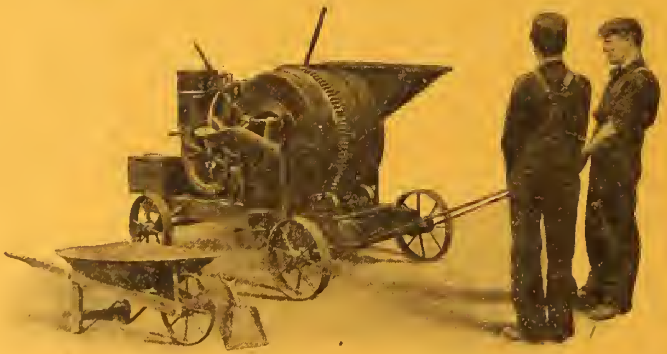
Everybody Who Builds

Concrete Walls, Concrete Walks or Curbs, Concrete Anything

Can have the best Concrete that can be made at the least possible cost

BECAUSE

Our No. 4 RANSOME MIXER



No. 4 Ransome Concrete Mixer.

is the equal of our larger machines in efficiency and is sold at a price which makes it an easy and a wise purchase for anybody.

It has a batch capacity of 4 cubic yards per hour, which is ample for any small concrete job. No. 4 Mixers are sold in one way only : i. e.—mounted on Trucks, with gasoline engine, direct drive. This is a powerful engine for its rated H. P. and the best designed—a most perfect operating engine.

The No. 4 Ransome is a great time saver in every respect. As we equip these machines with a special batch charging hopper, which is being filled while the batch in the drum is mixing—no time is lost in charging drum. By the simple lever arrangement, the whole unmixed batch is fed into the drum in an instant and the loading gang keeps right on with their work without any waits whatever. The batch is instantly discharged by merely reversing the discharge chute.

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Vol. 26 Toronto, October 30, 1912 No. 44

Contract Record and Engineering Review

ESTABLISHED 1886

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Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

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RESERVOIR TANKS

for city and town Water Systems,
Fire Protection, Power Plants,
Hydraulic Mining, Irrigation, etc.
One-half the cost of Iron Pipe—
and better.

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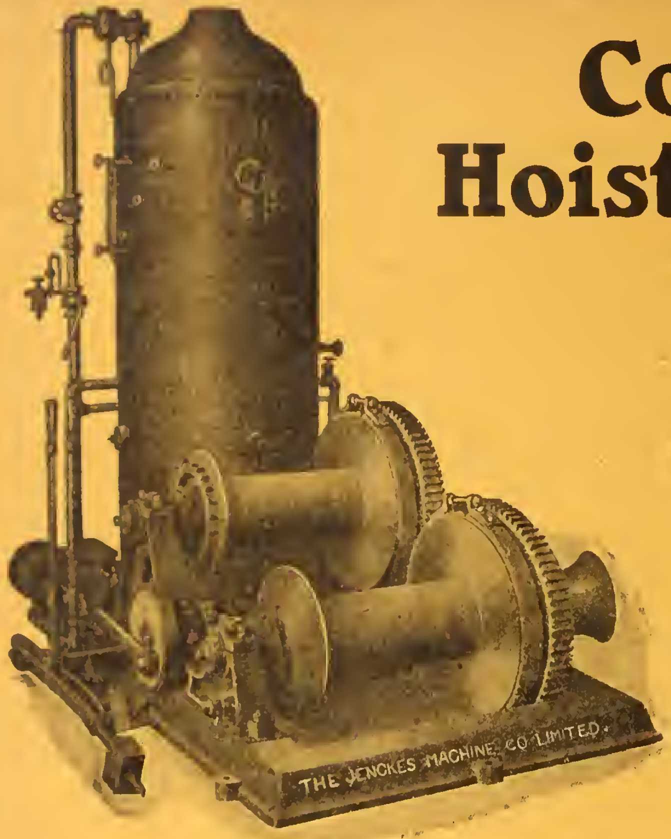
Full Particulars and Estimates Furnished

Alphabetical Index of Advertisers, Page 16 Classified Directory to Advertisements, Page 6



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¶ Especially designed to fully meet the peculiar requirements of Contractors' work.

¶ Great care has been taken to secure maximum strength and rigidity without unnecessary weight.

¶ Built in all the popular sizes.

¶ Full particulars and prices to interested parties on request.

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General Offices: Sherbrooke, Que. **Works: Sherbrooke, Que. - St. Catharines, Ont.**
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CROWD IT

RUSH IT—JAM IT

UP WITH WORK——THERE'S NO DANGER
OF THE

"AMERICAN" Hoisting Engine

"LAYING DOWN"

IT STANDS FIRM UNDER THE HARDEST DUTY
IT PULLS TO THE LIMIT
IT'S THE ENGINE WITH THE PERFECT FRICTION

If you need EXPERT ADVICE regarding Hoisting Engines, write us

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Gorman, Clancey & Grindley, Edmonton, Calgary and Nelson, B.C.
Vancouver Machinery Depot Ltd., Vancouver, B.C.
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Concrete is the best and cheapest material for permanent paving of city streets as well as for country roads.

$$\frac{\$1,000}{\$6} = 166.6 \text{ miles.}$$

The cost of keeping a mile of macadam road in good condition for one year will pay for the maintenance of 166⅔ miles of concrete road for same period.

The first concrete road was built in Bellefontaine, Ohio, nineteen years ago. The cost of maintenance has averaged **$6 per mile per year.**

Six years ago New York State started to build 12,000 miles of macadam road. Fifty million dollars was voted for the work. To date, 3,674 miles have been improved, and $49,000,000 has already been spent—or over $13,000 a mile—and the present cost of maintenance, only six years after the first mile was built, is **$1,000 per mile per year.**

Is it any wonder that the New York Road Commission, in asking for another fifty millions, has promised the people to spend it for concrete highways?

Wayne County, Michigan, has built 33 miles of concrete roads since 1909, and the farmers of Wayne County are so well satisfied that they no longer consider macadam roads.

Canada's era of road building is just beginning. Will she profit by the experience of these other commonwealths? Will she spend her road money on roads that constantly need repair—or will she build permanent roads?

The engineers of our Free Information Department will gladly supply any information on concrete highways that is desired, without cost or obligation to the enquirer.

Canada Cement Company, Limited

Head Office - Montreal

Sales Offices at

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Reasons Why

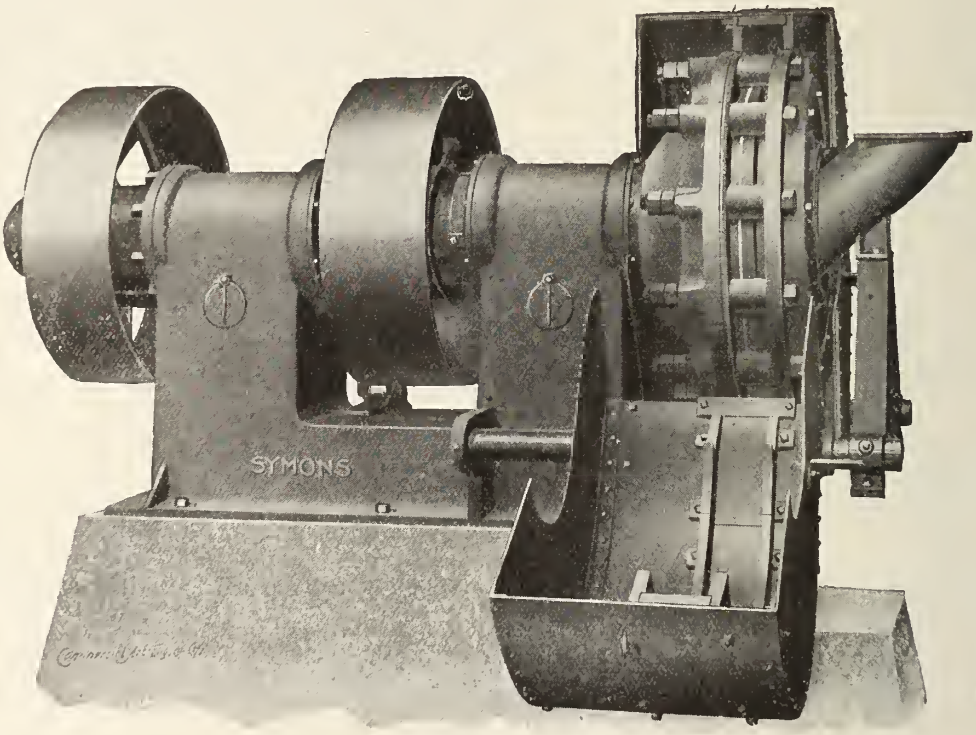
The Symons Disc Crusher

Has Won Its Reputation

It Is The Only Crusher

which will take rejections, screened or unscreened, from Standard Gyratory Crushers and reduce same rapidly at one operation to ¾ inch size and less.

Equipped in every case with manganese crushing members which wear smooth.



which will successfully reduce wet or dry gravel boulders mixed with sand, to smaller product

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Which throws out the stone the instant it is reduced to proper size.

Which will crush a large capacity of smalls down to ¼ inch.

In which both crushing members rotate together with a flywheel effect, to conserve momentum and insure smooth running.

It excels in economy of power, in uniformity of product, and in low repair cost.

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Montreal, 318 St. James St.
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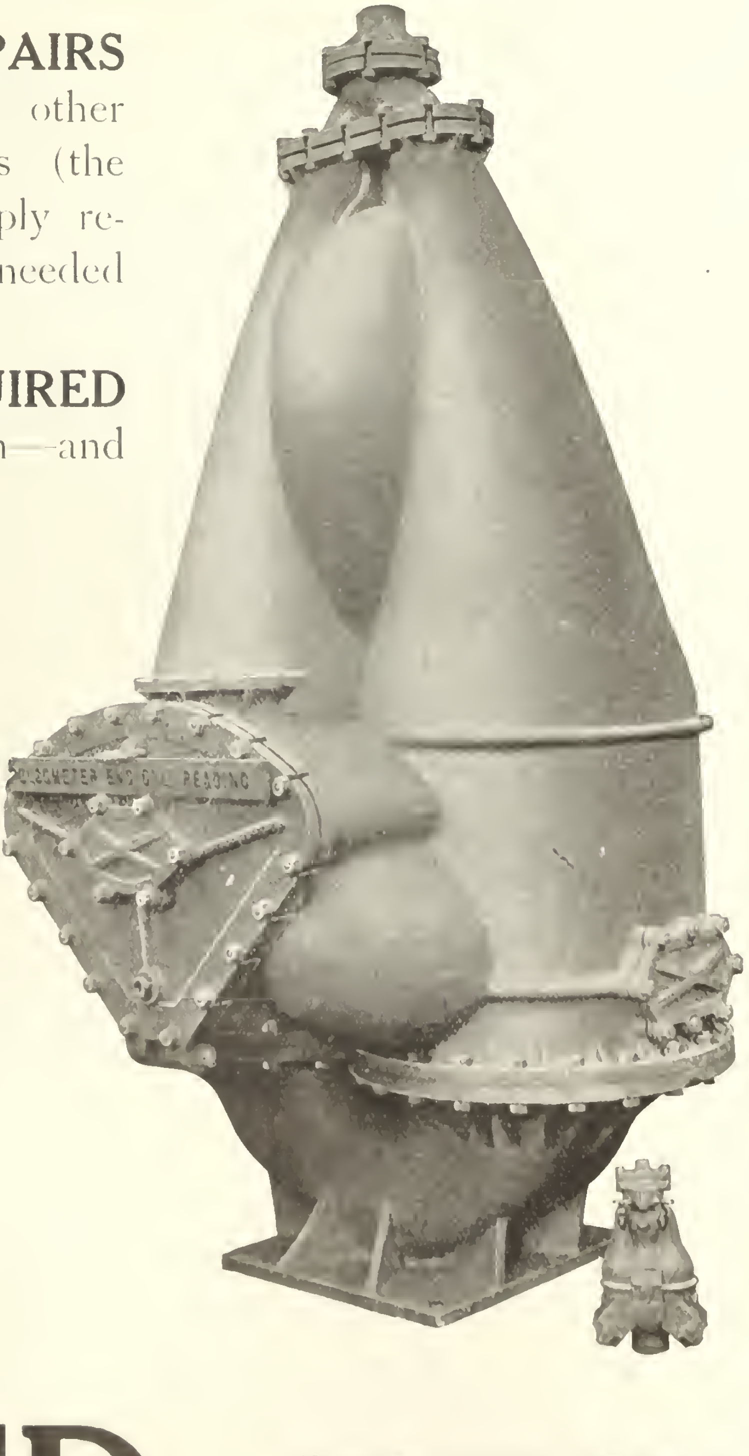
Cobalt, opp. Right of Way Mine.

MUSSENS

Pulsometer Steam Pumps

Are decidedly in a class by themselves



HEY REQUIRE FEW REPAIRS
-are not subject to wear like other imps—the only moving parts (the lves) can be readily and cheaply re- wed, but such renewals are needed ly at long intervals.

O SKILLED LABOR REQUIRED
-Hang it up, turn on the steam—and may be left working for eeks without anyone going ar it.

ILL PUMP ALMOST ANY- HING — Semi-liquids and itty substances such as mud, uid cement, slurry and sew- e sludge pumped without triment to its working.

OTHING TO STICK IT UP—
here being no frictional parts will start at once, even if it s been idle for a long time.

o rods, no pistons, no glands.

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(Continued on page 12)

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Don Valley Porous Terra Cotta Fireproofing renders a building absolutely safe, and Don Valley Bricks have the beauty of appearance that is so necessary a factor in present day construction. A striking proof of the high estimation in which Don Valley Products are held by Canada's foremost architects is furnished by the numerous buildings in which they have been used; these buildings being, in many cases, the finest of their kind in Canada.

"SPECIFY DON VALLEY PRODUCTS"

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LIGHT + VENTILATION = PROFITS

FENESTRA SOLID STEEL WINDOWS will provide your factory with an abundance of pure air; and light practically as good as that "out doors." Your employees will be able to do more and better work.

FENESTRA STEEL SASH not only increases production, but also reduces costs. Window upkeep expenses and artificial lighting bills are reduced almost to the vanishing point.

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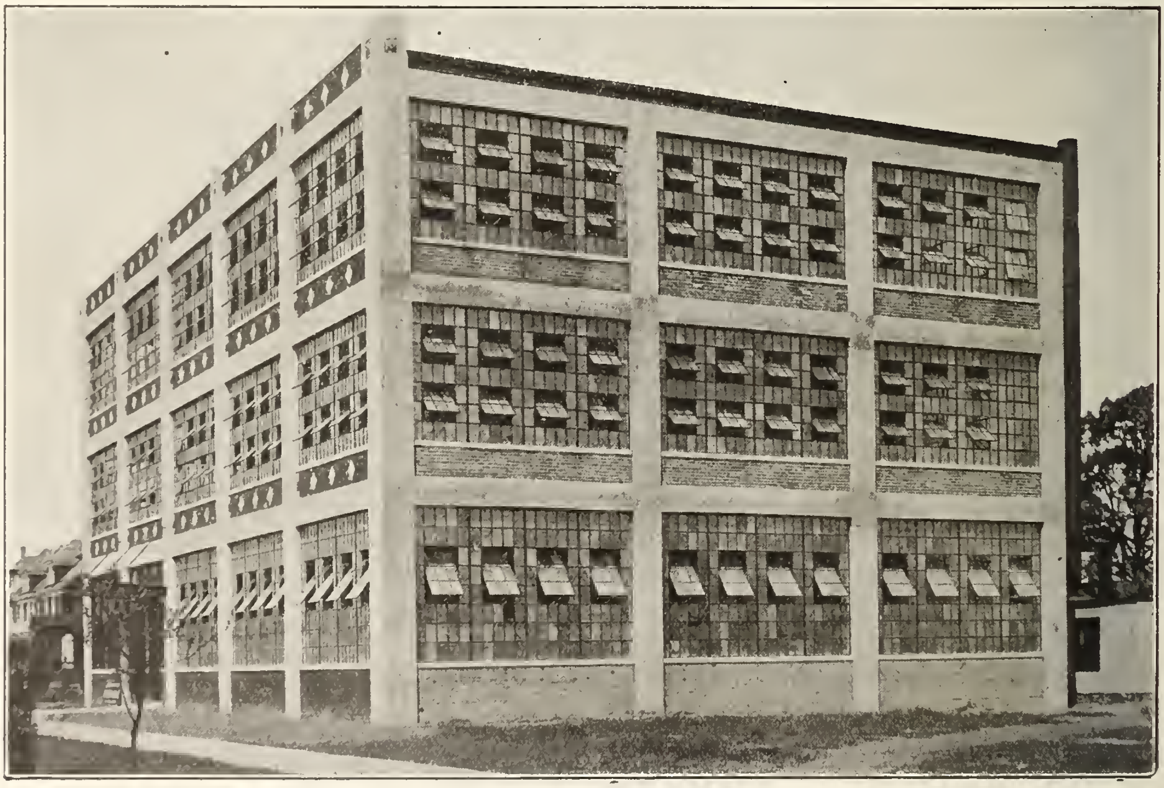

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WRITE TO-DAY FOR CATALOG describing fully the merits of steel sash for all types of industrial buildings, large or small. FENESTRA has no equal for windows for foundries, power houses, factories, public buildings, machine shops, draughting rooms, railroad shops or any other buildings where the maximum light and ventilation are desired.

STEEL AND RADIATION, LIMITED

TORONTO, CANADA

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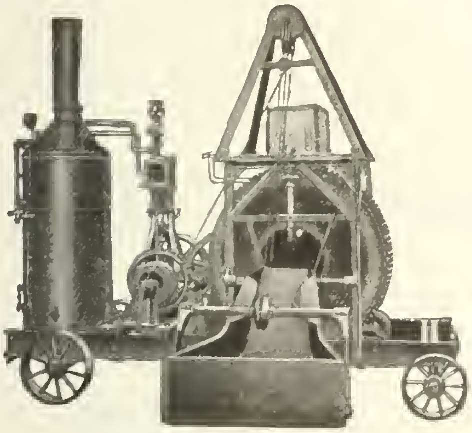
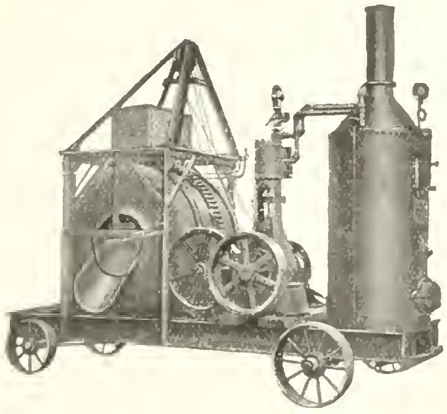


London Standard Drum Batch Mixer

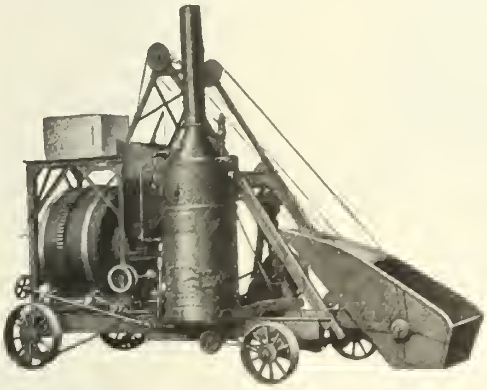
must be built Strong and of the Best Material.

The First Cost of a Concrete Mixer is only a Small Item if it is continually breaking down.



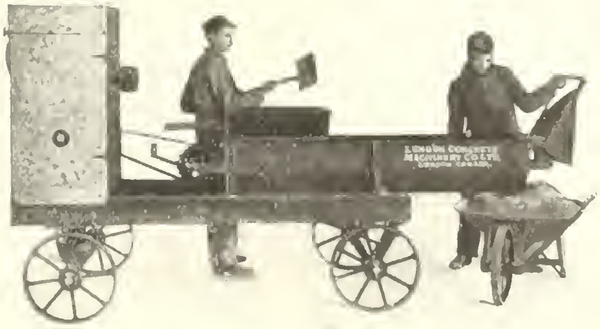
London Standard Drum Batch Mixer

The London Mixers are built **up to a Standard** not down to a price. **By manufacturing on a large scale** we have been able to sell **High Grade Machines** at Remarkably Low Prices.

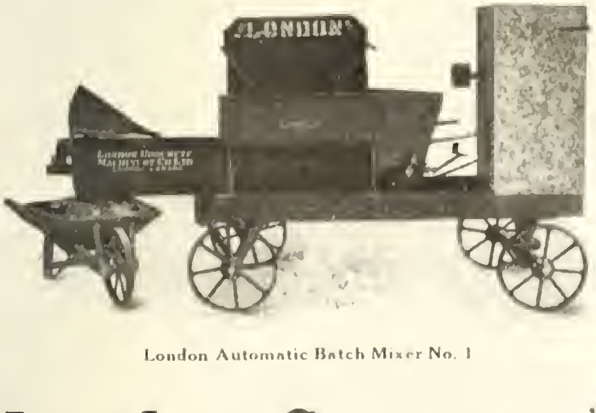


London Paving Mixer with Front Loader and Rear Discharge

We manufacture a complete line of Concrete Machinery and Cement working Tools and Contractors' Equipment.

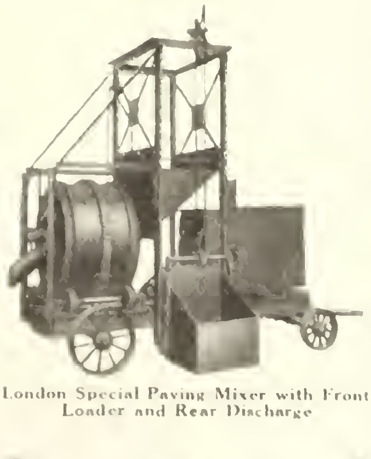


London Mortar Mixer



London Automatic Batch Mixer No. 1

Ask for our 1912 Catalogue. It contains information for every Contractor.



London Special Paving Mixer with Front Loader and Rear Discharge

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

AGENTS:—

The Foss & Hill Machinery Co. Montreal, Que.
B. C. Equipment Co., Vancouver, B. C.
G. B. Oland, Halifax, N. S.
General Supply Co. of Canada, Ottawa, Ont.

We are the Largest Manufacturers of Concrete Machinery in Canada

For That Rush Job

you must have an equipment that works ***quickly*** and ***well***—that saves money and labour. Do you want an immediate delivery of a mixer that will see you through your rush contract on time, do the best work always and economise right along the line? Then come and see the

Wettlaufer Improved Heartshape Mixer

It will help you to make yours a more profitable job

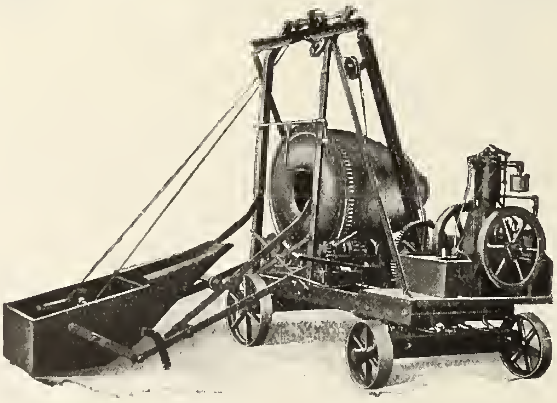
Strong Construction

Automatic Operation

Low Working Cost

Quick Loading

Clean Dumping



Wettlaufer No. 1 Heartshaped Mixer

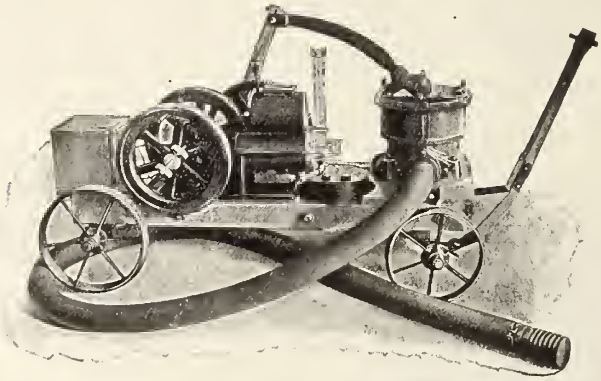
Rapid and Perfect Mixing

Increased Capacity

Minimum Repairs

Long Life

The Most Efficient Pump for Abutments and Foundations



Wettlaufer New Gasoline Driven Water Pump

Capacity 2,000 gals per hour

Does the Work of Two Men

Full particulars and Catalogue on request. *Continuous demonstrations at*

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Steelcrete

The most perfect system of concrete reinforcement on the market. Expanded Metal Cold Drawn—gives maximum stiffness, strength and high elastic limit.

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Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

All

Fire Proofing Material

used by the

Building Trade

supplied by

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WESTERN SALES MANAGER
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Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery—Send your orders for crushed stone to

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French Caen Stone Cement

Monarque Brand and Cementaline. Rich in appearance and of unlimited durability, as good as natural stone—but cheaper. Full particulars of

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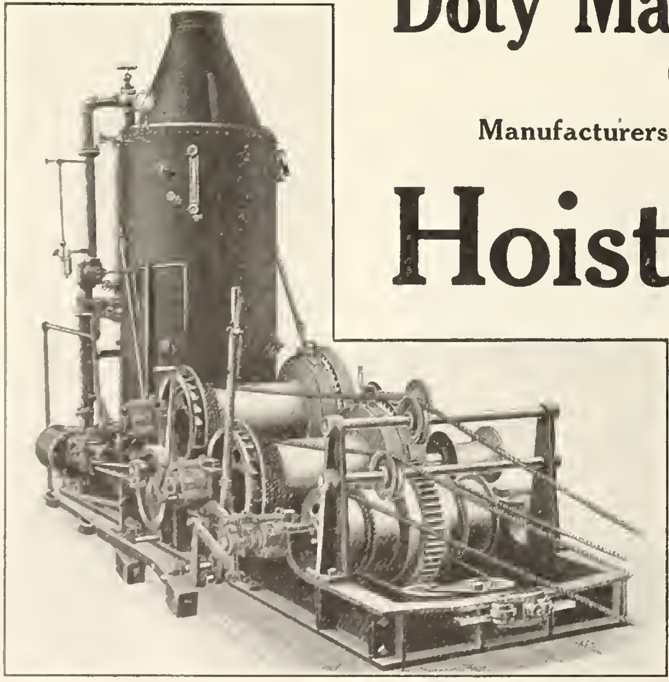

This cut illustrated our Standard Double Cylinder Double Drum Hoisting Engine with Derrick Swinger attached. "Superior to any other on the market." All parts constructed, guages and templates and every engine tested under steam.

The
Doty Marine Engine & Boiler
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Manufacturers of **Superior**
Hoisting Engines
Derrick Swingers, Material Elevators, etc.
for
Contractors, Mines and Quarrymen

A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

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To buy our Engines is a Guarantee of Satisfaction

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— Stretched in the Making

Fabric belts are liable to stretch—but Sawyer will not stretch excessively because the stretch has been taken out in the making.

We fully realize the importance of this item to the user and have taken care to insure our belt against this criticism. We guarantee our belt not to stretch excessively if properly placed on the pulleys. Write for further information in our book No. 3.

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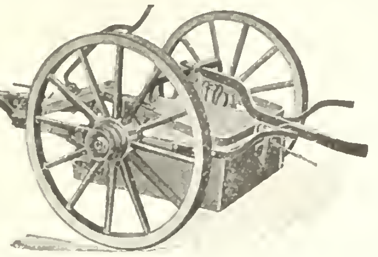
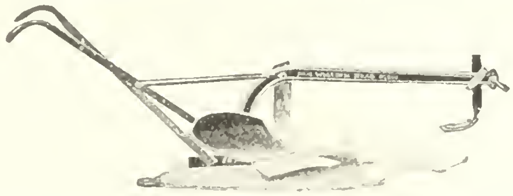


Backed by a Reputation

Ask any contractor of large experience. He will tell you that for over a quarter of a century there has been maintained a reputation for largest capacity and greatest durability for the

"Western" Line of Wheeled and Drag Scrapers and Grading Plows



The reason is a life-time's experience in actual contract work **combined with** an extensive manufacturing experience and every machine has been perfected after years of the most rigid tests,

Western Wheeled Scrapers, the pioneers and most extensively used characterized by square-shaped pans bent cold, general sturdy construction and many patented exclusive features. Built in any size.

Western Drag Scrapers, Chicago Tongue and Western Buck Scrapers.

Western Railroad and **Township Plows,** designed for hardest service and proved by many years of use. Any size from 2 to 16 horse power.

[illegible] complete catalogue of earth and stone handling machinery.

Western Wheeled Scraper Co.

Earth and Stone Handling Machinery **Aurora, Ill.**

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS	1903	$ 0.00	1908	$ 93.26
	1904	3.30	1909	200.46
	1905	9.35	1910	14.07
	1906	37.33	1911	2.29
	1907	16.11		

Total $376.17 or $5\frac{2}{3}$c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.

Hagersville, Ont. **Limited**

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"PIONEER" Highest Quality ASPHALTS
TRADE MARK

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For Asphalt Macadam Roads, Asphaltic Concrete, Sheet Asphalt Paving—and Filler for Brick and Block Pavements

and results will be highly satisfactory. "PIONEER" ASPHALTS are 99.5 per cent. pure bitumen. They are waterproof and weatherproof. Can be used for all purposes where an asphalt can be used.

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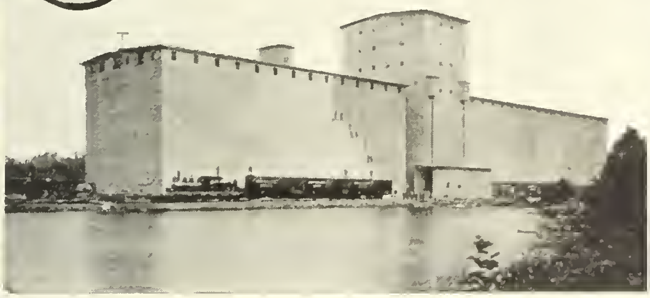
THE CANADIAN MINERAL RUBBER CO., Ltd.
Canadian Express Building, MONTREAL 503 Canada Building, WINNIPEG

Barrett Specification Roofs



On Four Great Granaries

To cover the four huge granaries illustrated herewith the Canadian Pacific R. R. engineers chose Barrett Specification Roofs for good and sufficient reasons.

These practical men know that these roofs will last *20 years or more.*

They further know that they will need no painting or maintenance expense of any kind and that the net cost per year of service will be infinitely lower than could be shown by any other type of roofing.

It is for these very reasons that Barrett Specification Roofs are used on more first-class buildings in the United States and Canada than any other kind.

A big roof generally means a Barrett Specification Roof, for the reason that the cost of big roofs is carefully scrutinized and ultimate economy carefully considered. Small roof areas ought also to have Barrett Specification Roofs, because they are just as economical and satisfactory there.

Copy of the Barrett Specification with tracings ready for incorporation into building plans free on request. Address nearest office.

SPECIAL NOTE

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired however, the following is suggested: ROOFING —Shall be a Barrett Specification Roof laid as directed in printed specification, revised August 15th, 1911, using the materials specified, and subject to the inspection requirement.

THE PATERSON MFG. CO., Limited

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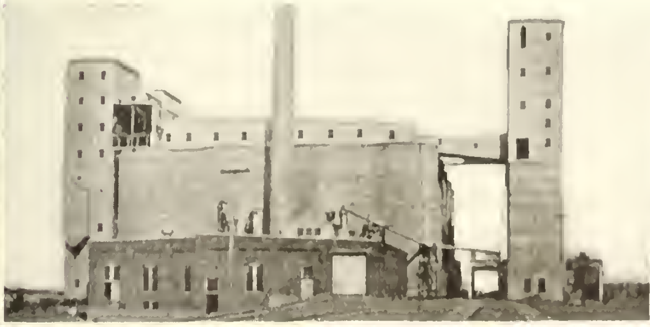

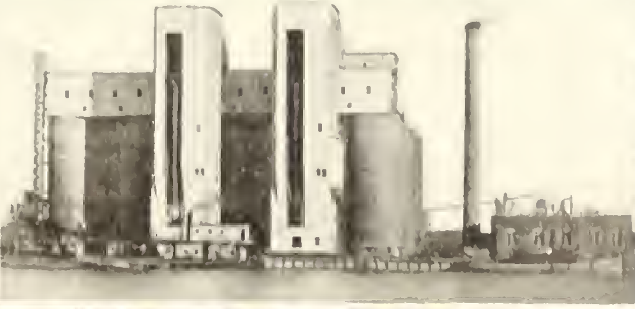

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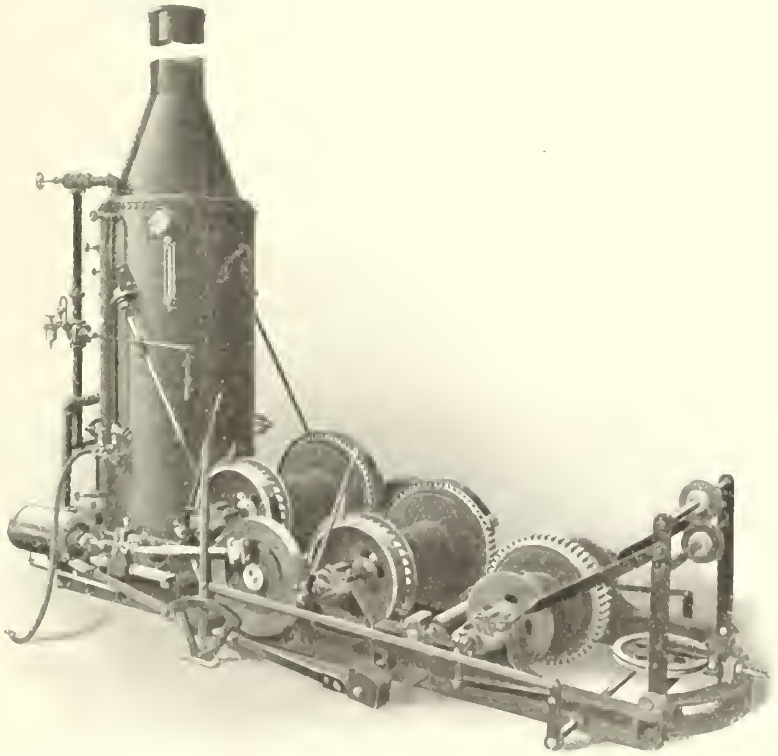
Compare a standard Napanee hoist point by point with a hoist of the same size of another maker. Measure the shafts and bearings, examine the materials used in the different parts, examine and test every detail. You will find the Napanee wins on all points:—

Better Materials - Better Designs - Better Proportions

Detailed specifications and illustrations furnished intending purchasers on application.



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Contractors Acetylene Flare Lights

Made in Two Sizes

SIZE NO 1—

8,000 Candle Power, operates 12 Hours on 18 lbs. Carbide.

Price F.O.B. Ottawa $95.00.

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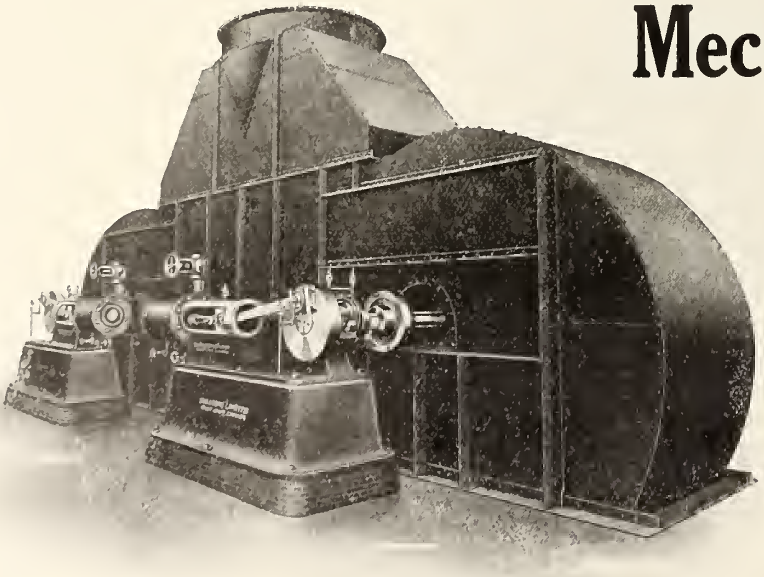

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"CEMENT FILLER" and "CEMENT FLOOR PAINT"

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ESTABLISHED 1848

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For application to the inner surface of exterior brick or masonry walls, above grade level. Prevents the penetration of dampness. Saves the cost of furring and lathing.

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For backing limestone, granite and other building stones. Absolutely prevents any interior acid, alkali, rust or moisture from reaching the surface of the stone.

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A chemical compound which, when mixed to the extent of 2 per cent. of the amount of Portland Cement used, will render cement or concrete construction absolutely waterproof against pressure. Is used for water-proofing floors, foundations, elevator and boiler pits, cement mortar troweled on the outside of rubble foundations, cement stucco, etc.

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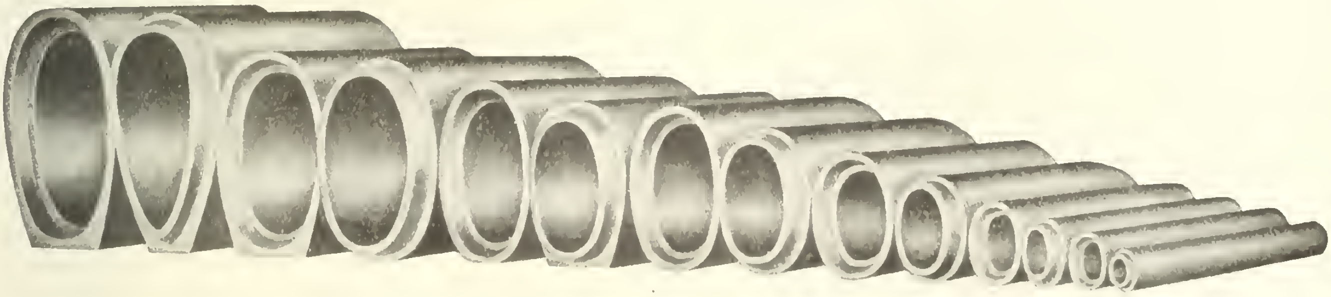

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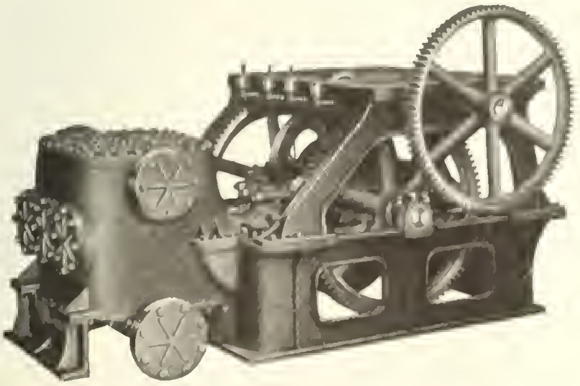

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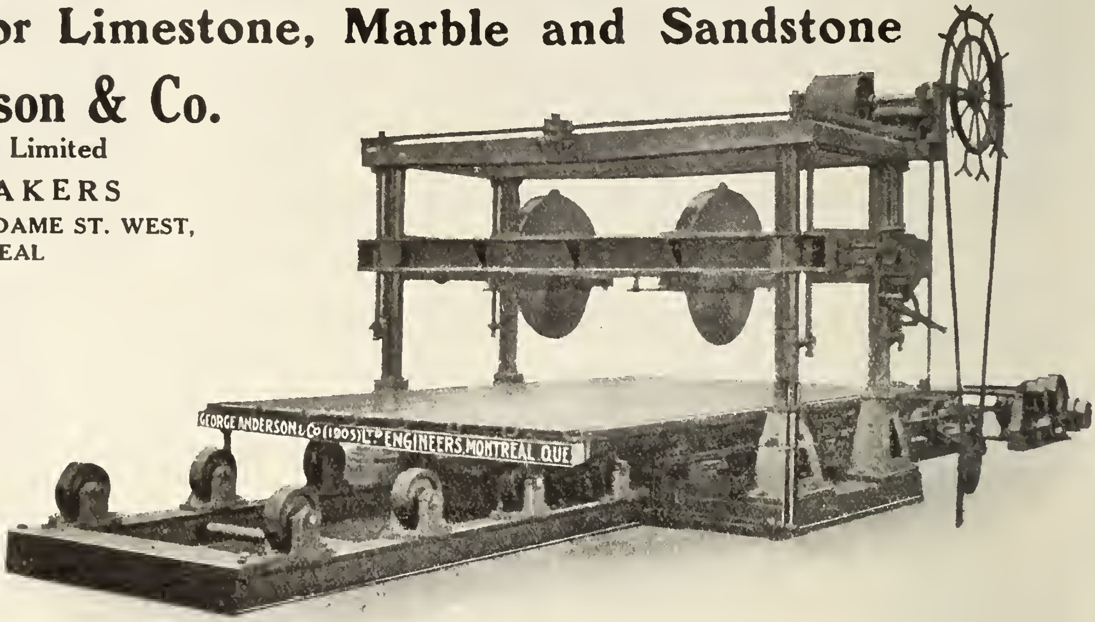

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About 50 of the above Machines at work in Canada

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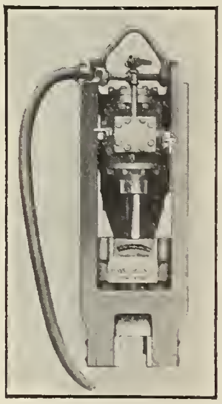

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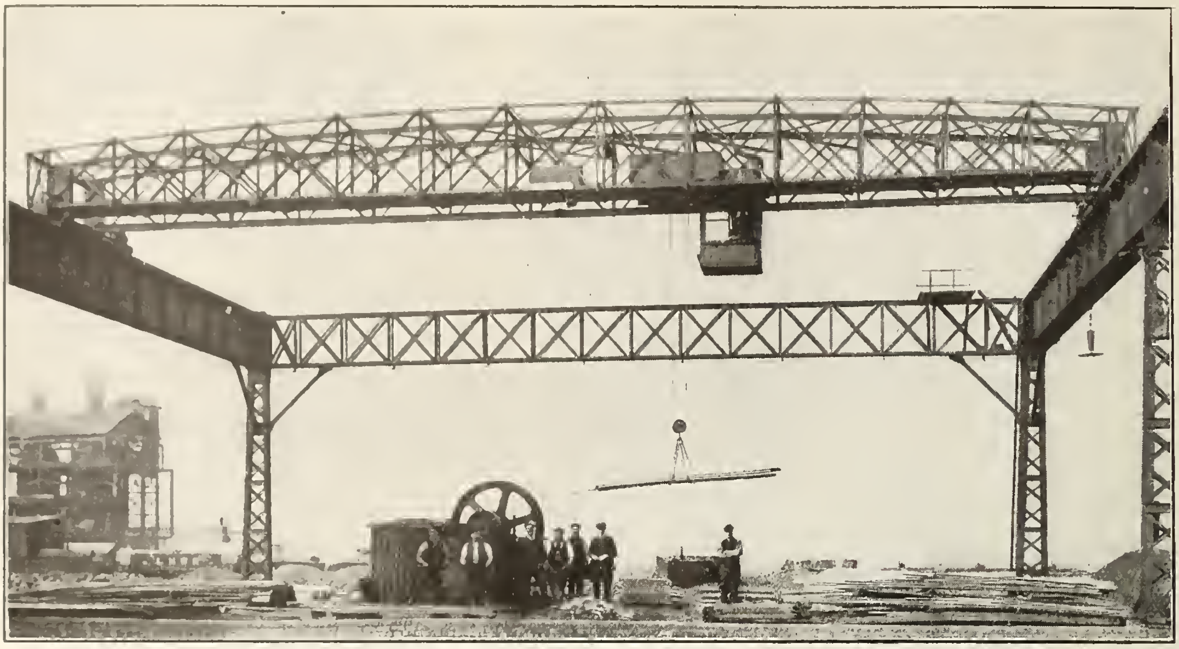

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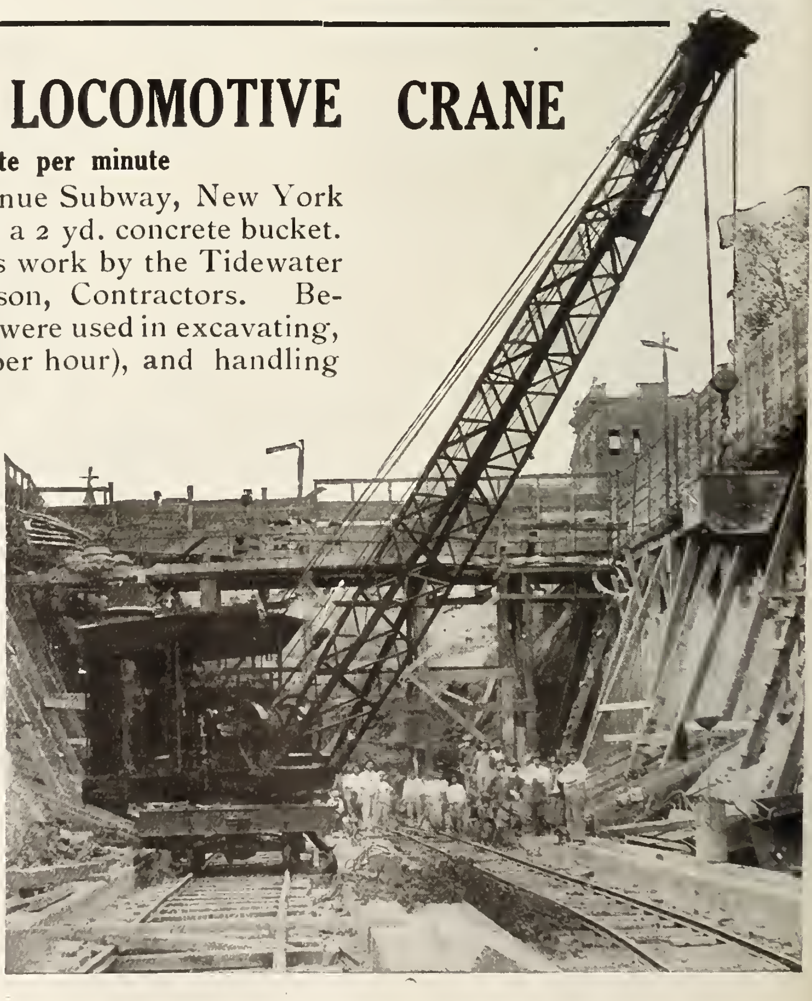

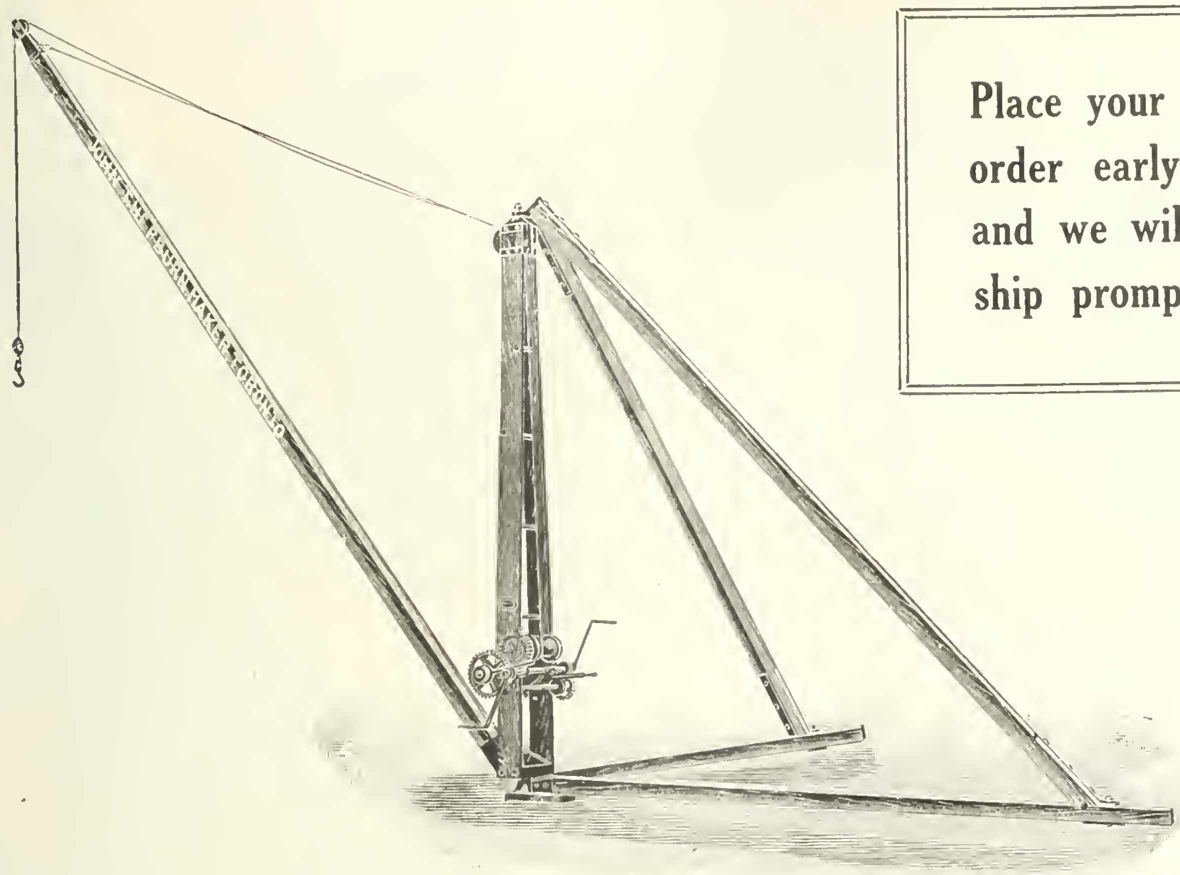
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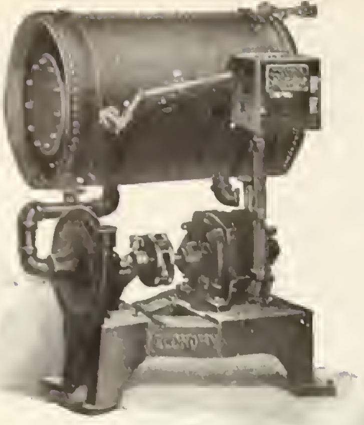

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An expansion tank, and automatic switch and a centrifugal pump automatically operated by an electric motor.

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Eliminates snapping and **cracking** in the radiators and pipes.

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Requires no attention other than occasional oiling.

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We carry in stock at Montreal a large supply of standard sizes and can make immediate delivery.

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For VENTILATING and COOLING

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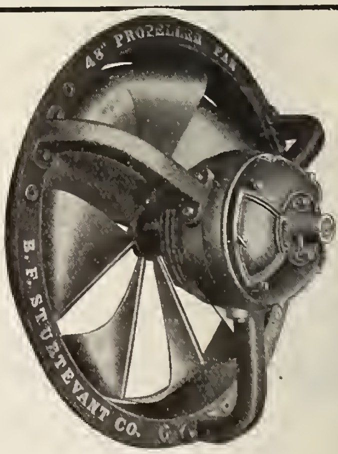
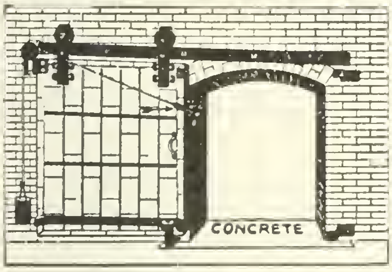


FIRE PROTECTION



People are beginning to realize the necessity of conservation from loss by ***fire.***

It is an actual fact that the people pay all fire losses out of their own pockets through the higher rates. They pay for fire Insurance protection and the Fire Insurance Companies are just the distributing centres for the money.

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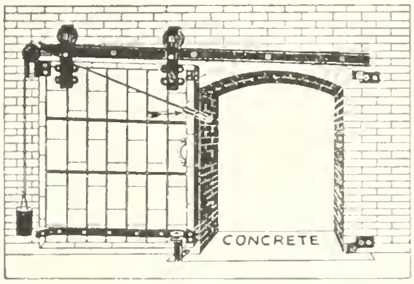

Our Products are adapted for use in the better class of office buildings, stores, factories and hotels, and are made in accordance with the rules and requirements of the Board of Fire Underwriters governing the construction.

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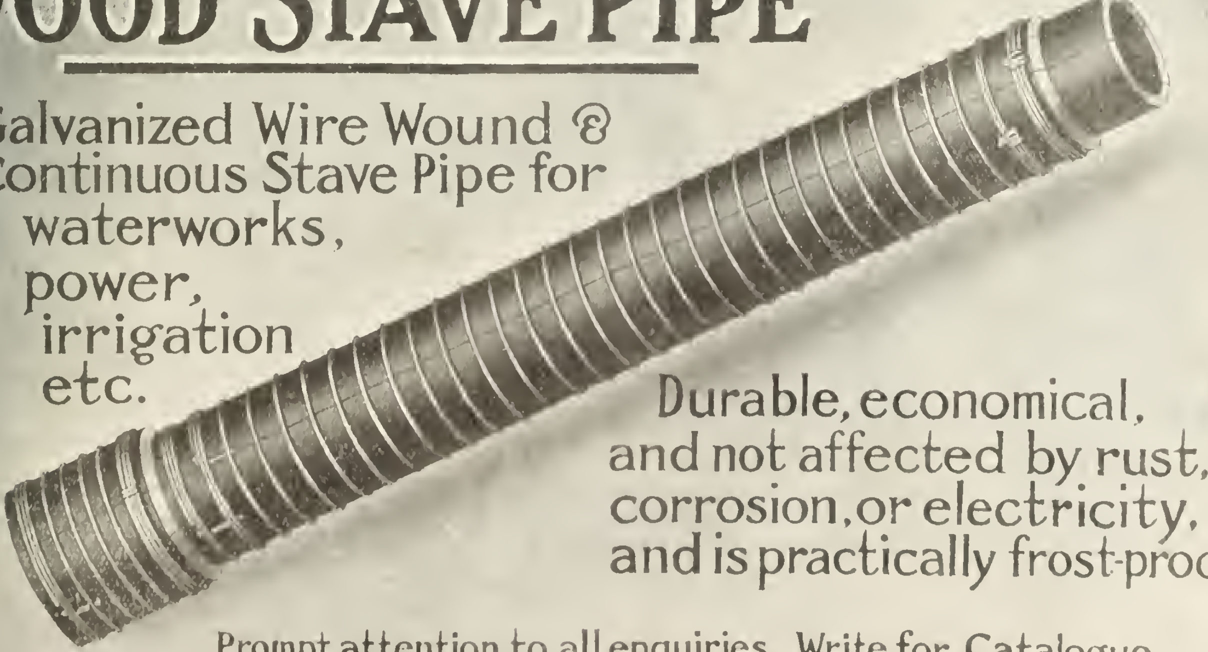

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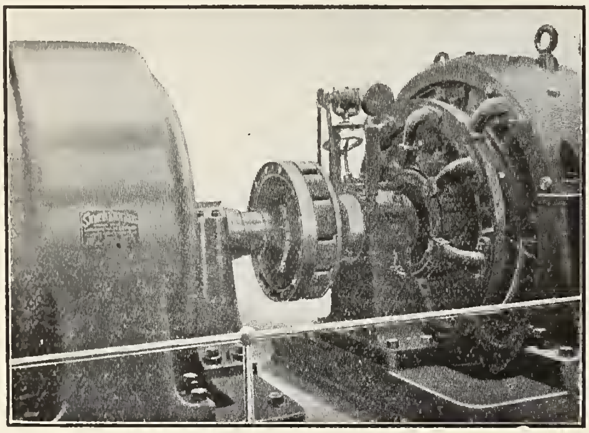

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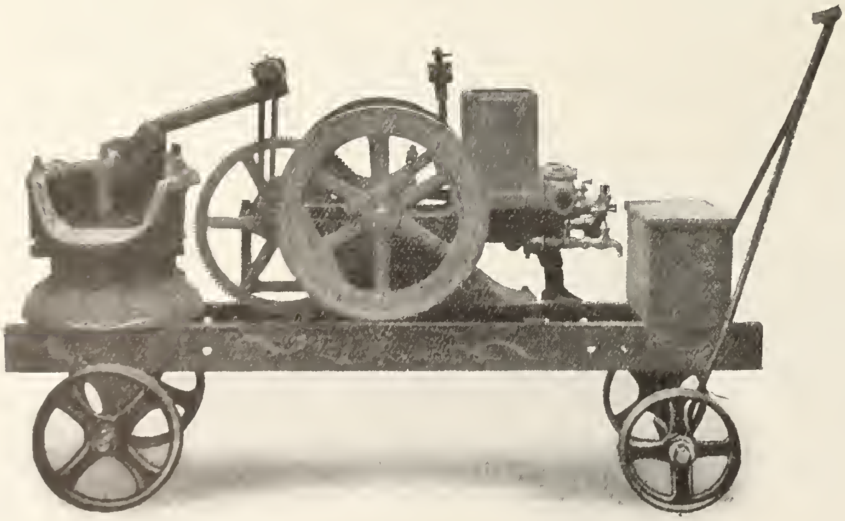

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Saving

$8.00 to $10.00 per day, with greater efficiency than could be attained with hand power pumps.

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Save Time, Trouble and Money

By Using a

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The contractor with men and teams cannot compete successfully with the man who owns a THEW SHOVEL.

THE REASON WHY

The smallest Thew does the work of from twenty to forty men at one-third of the cost. The Thew, being able to load a wagon a minute, will often save enough in team time to pay its entire operating cost, which means that you are loading dirt for practically nothing. Hand labor is difficult to secure, hard to hold and inefficient in practice, while the Thew is always on the job

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MADE IN SIZES

12 to 72 inches Diameter

Used extensively for Water Supply for Mines, Mills, Hydraulic Operations and High Pressure Hydro Electric Installations.
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4000 Pairs 20 lb. Fishplates.
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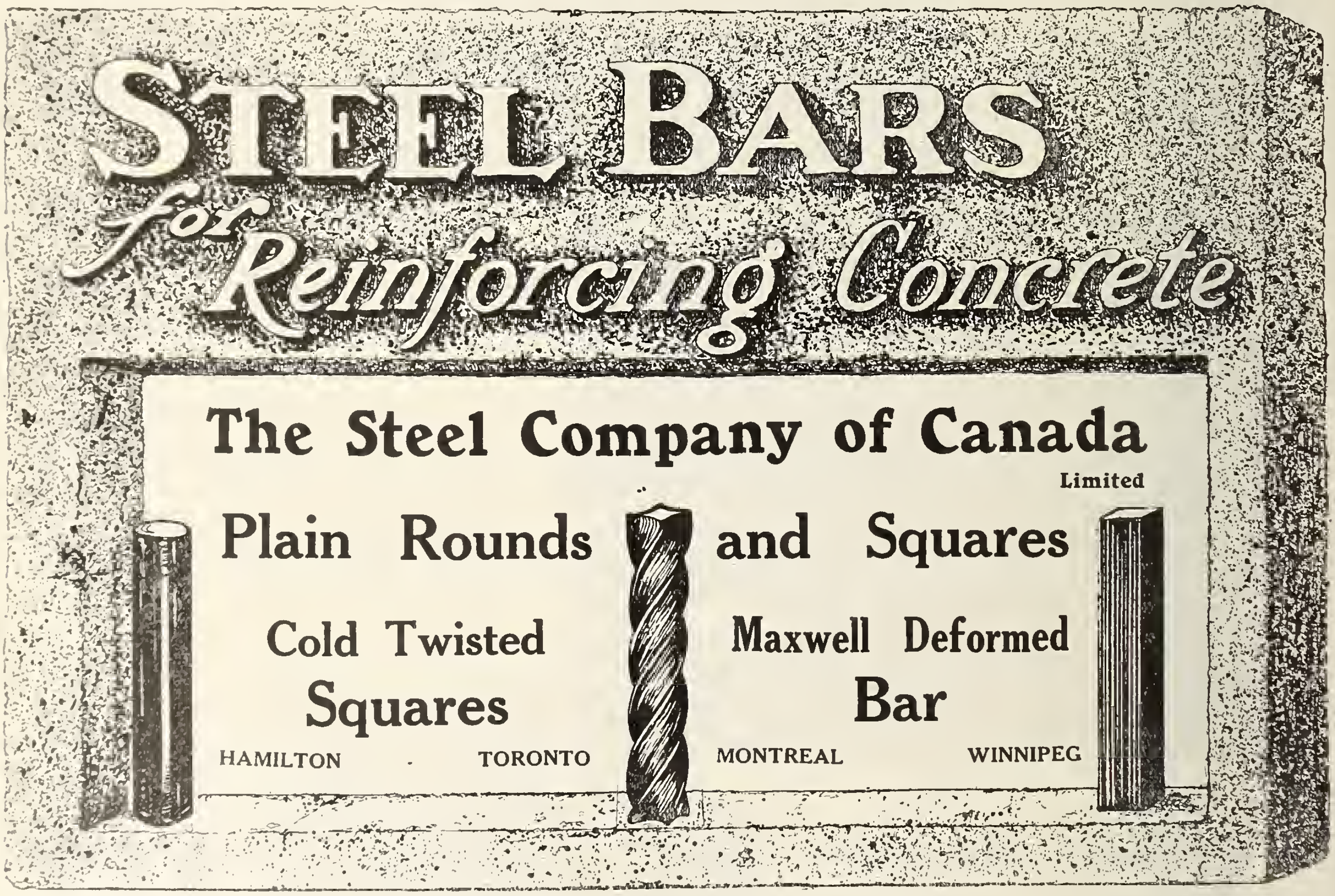

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The Steel Company of Canada
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Plain Rounds and Squares

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Maxwell Deformed Bar

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Annual Capacity 12,000 Tons

Stock Process for Small Work
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Outlook Bridge on the C. P. R. built by the Canadian Bridge Company who in common with the other large bridge builders have found Beatty Hoists thoroughly reliable for this trying servic.

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STEAM and ELECTRIC

Have stood the test of time and given satisfaction wherever they have been placed.

Ask the man who has one.

We have shipped Engines into almost every part of the Dominion and will gladly put you in touch with our nearest customer.

Can furnish any size or type and give prompt shipment.

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Plain Rounds, Squares or Twisted Squares.
Cross Arm Braces, plain and galvanized.

ANGLES from ¼ x ¼ in. up to 2 x 2 ins.
ROUNDS and SQUARE from ⅜ in. up to 1¼ ins.

We can ship from stock

FLATS from ¼ in. up to 4 ins. in width, and other special sections.

Ask us for prices—they will interest you.

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This pavement was laid to secure a test of the wearing qualities of Wood Block.

The street was paved, partly with Asphalt of standard construction and partly with Creosoted Wood Block.

The Asphalt was taken up some time ago and street newly paved.

The guarantee has long since expired on the Creosoted Wood Block but the pavement is as good as ever, the surface wear is scarcely apparent, and it will be many years before repairs are necessary.

We have the very best materials and we endeavor to manufacture DOMINION WOOD BLOCKS up to the highest possible standard.

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A Belt Which Conveys ALL the Power

Practical men know the drainage of power from a slipping belt, *and because they know,* they are buying

GOODYEAR RUBBER BELTING

Which Neither Slips Nor Stretches

It is built up, layer upon layer, of close-woven, long-fibre, cotton fabric, rubberized and cured under Goodyear processes. And every Goodyear belt has in it the lowest possible minimum of stretch, because the belt is "cured" whilst stretched to the limit of safety in a special machine.

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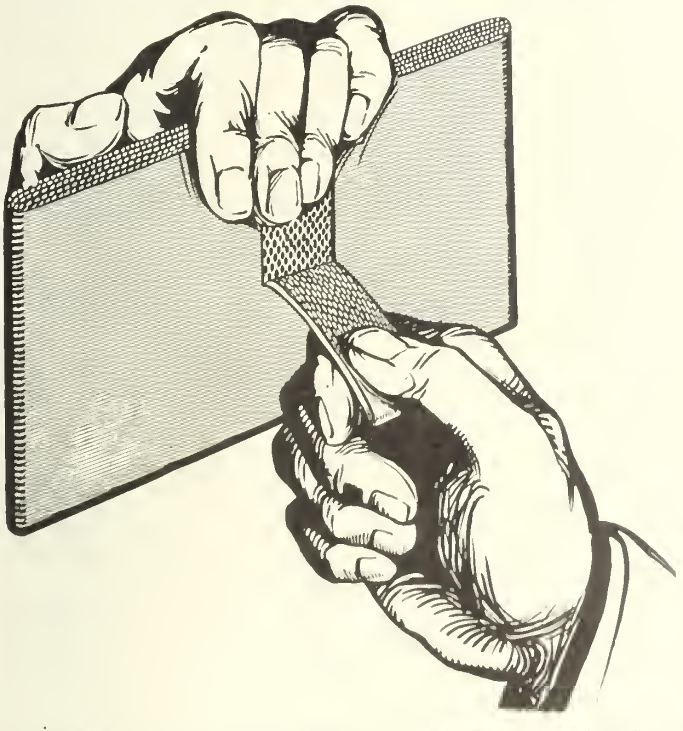

Look into the Belt for Yourself—Try to Tear it Apart.

Make a cut in the top layer—and then try to pull it apart. You will get a faint idea of its strength.

That is the result of forcing rubber at a tremendous pressure through the fine cotton fabric—separating every strand—thus abolishing all internal friction or grinding. Whilst these layers of fabric are afterwards so compressed as to be almost homogeneous, the finished belt bends easily, the "duck" being so woven as to retain complete pliability in the finished belt.

For Main Drives and High Speed Pulleys GOODYEAR Belting is the Best

It has all the tensile strength necessary to absorb tremendous strain without slip, stretch or rent. The grip of rubber and the prodigious strength of hard-twist cotton fabric are united, and prove equal to every emergency.

Where the power transmitted is high, and great tensile strength is essential, Goodyear Rubber Belting proves its worth.

EVERY GOODYEAR BELT IS SUBJECTED TO A STRINGENT TEST BEFORE LEAVING THE FACTORY, and what is more, the materials used in the manufacture are also tested in the Goodyear laboratory before using.

IF YOU USE A BELT AT ALL IT WILL PAY YOU TO USE A GOODYEAR

Loss of power is loss of profit and an inferior belt is dropping power all the time. Goodyear belting quickly earns its cost in power saved and trouble avoided.

TWO HUNDRED AND FORTY ROLLS—A TOTAL OF 72,000 FEET

We have just received an order for this quantity of GOODYEAR RUBBER BELTING from one business concern in the west, for the equipment of interior elevators. Such an order shows supreme confidence in the quality of GOODYEAR Belting.

If we have not just the belt you require we will make it for you

In the choosing of belts our booklet would be of great assistance to you. We supply it free. Write to our nearest branch for one

The Goodyear Tire and Rubber Company of Canada, Limited

Factory, Bowmanville, Canada

BRANCHES: Victoria, B.C. Vancouver, B.C Calgary, Alta. Regina, Sask. Winnipeg, Man. London, Ont. Hamilton, Ont. Toronto, Ont. Montreal, Que. St. John, N.B.

A QUESTION

Why has the demand for Hardwall Plasters in the Province of Ontario and Quebec more than doubled in the past year? There must be a reason for this wonderful increase. There is, and

Here's the Reason

With the advent of the Alabastine Company, Limited, into this field about eighteen months ago, there came on the market a line of Plaster Products far superior to the Hardwall Plasters formerly offered to this trade. These plasters were tried out by the trade and found to be

Economical, Strong, Durable
Uniform and Dependable

in fact everything that Hardwall Plasters should be. Their labor and time-saving qualities were appreciated by the trade. Their strength and uniformity, by the building public. This is the answer and the answer for the

60,000 Tons Shipped in 12 Months

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Pulpstone Wood Fibre Plaster
Exterior Plaster for Outside Use
Pulpstone Gypsum Blocks
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and all other Gypsum Products

The Alabastine Co., Limited - Paris, Ont.

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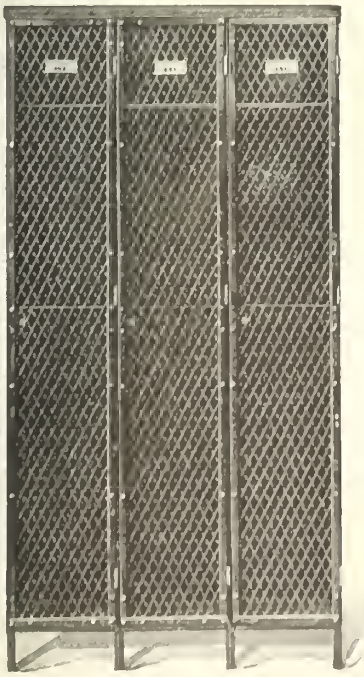
'Meadows' Metal Lockers



Make friends because of their substantial construction and unique features. We make several styles and sizes of these lockers. We'll know what you want if you just hint at your requirements.

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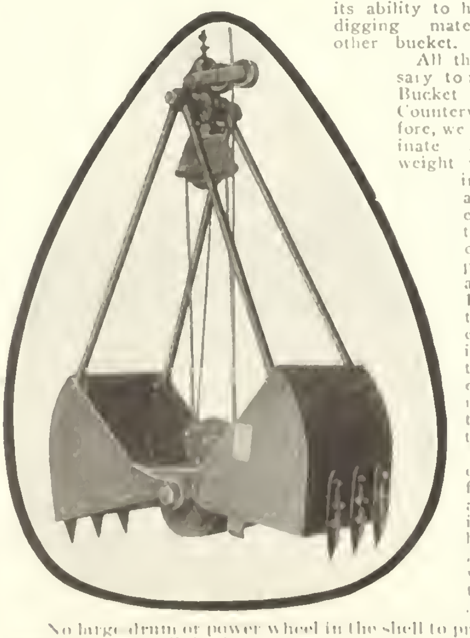
GEO. B. MEADOWS

Toronto Wire, Iron and Brass Works Co., Limited
TORONTO, CANADA

The Owen Clam Shell Bucket

Succeeds Where Others Fail



Because of its scientific construction, it has demonstrated its ability to handle more hard digging material than any other bucket.

All the weight necessary to make the "Owen" Bucket dig lies in the Counterweight, therefore, we are able to eliminate all unnecessary weight in the shell, making it strong and adaptable to penetrating hard materials. Operated on the purchase principle, exerting a closing power 100 p. c greater than other buckets. This power is undiminished throughout the entire stroke and is unaffected by the position of the bucket

Will not tip over, and therefore especially adapted for working under water because of their ability to dig when resting on the material at an angle.

No large drum or power wheel in the shell to prevent the bucket from taking a full load.

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529-531 Rockefeller Building
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Builders' Supplies and Specialties

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SUPERIORITY PURITY DURABLE AS THE PYRAMIDS

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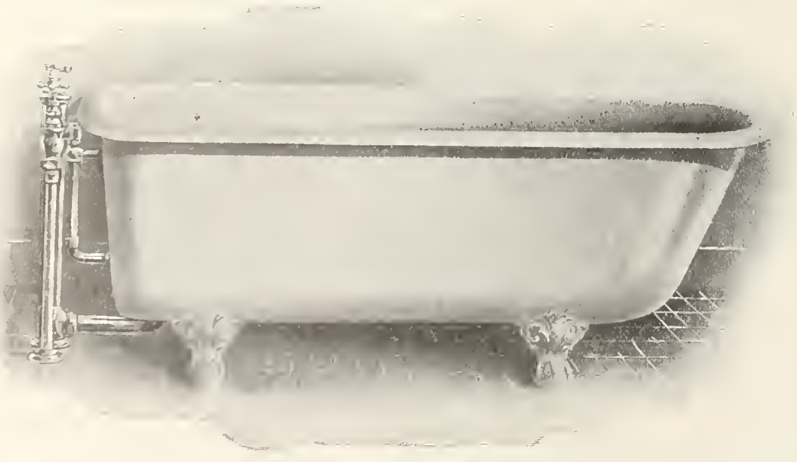

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Concerning Corporation Inspectors

A correspondent of this journal draws attention to the subject of corporation inspectors, having regard to the manner of their appointment, their duties and their remuneration. The contention is made that at present many municipal corporations throughout the country are incurring a considerable loss in this department. Under the system obtainable in most places the position of works inspector is a sinecure. Generally the appointees are hopelessly inefficient, having had no training for their duties—all of which comes as an additional burden upon the already overtaxed engineer-in-charge.

The trouble is that the inspector's office is not taken seriously enough by the city. The responsibilities attached to the work should have adequate recognition and the remuneration for the work should be on a corresponding scale, in which case it would not be difficult to secure efficient men, but hitherto there has been laxity in the appointment of these men and with that laxity comparatively small pay has attached to the office. It is not to be expected that capable men will accept inadequate remuneration for their services.

The greatest cause for complaint, however, is found in the manner by which these men are appointed. It is contended that the main consideration is "pull" and that qualifications have little weight. The positions of inspector are practically in the hands of the aldermen or controllers who use their influence on behalf of their friends with little reference to their capabilities and experience. This is radically wrong. An engineer cannot place any confidence in such an "inspector," and consequently he is saddled with the detailed supervision of all constructional work. In fact, he is fulfilling the duty of the inspector as well as his own, drawing one salary as engineer, while the inspector, underpaid though he may be, draws one salary also and is practically useless. If anything goes wrong it is the engineer who is blamed. The worst feature of the situation is that, as a rule, it is useless to think about the dismissal of an incompetent inspector for the reason that he generally has the support of some influential friend. This state of affairs is denounced strongly by the correspondent of this journal.

It would appear to be high time for some reform to be effected in the manner of these appointments, and that the appointees should be required to show evidence of their ability and experience. Such reform should be insisted upon by those who have to pay the cost of local improvements, for it is they who are the losers under the present system. The inspector should be paid a reasonable wage, certainly not less than four or five dollars a day. During the winter months he should have a retaining fee or be provided with work. In short, the position should be raised to a higher grade and should be made more responsible, more remunerative and more attractive. It is in this way only that the city will get full value for its money and be assured that all the works that it undertakes are carried out to specification.

The Library as a Business Asset

LET us at the outset agree that when we speak of the library as a business asset, we speak not of its value as so many books and pamphlets, but of its value as a contributing agency to those more fundamental possessions to which material assets owe their existence. What then, has the library contributed and what may it in the future hope to contribute that will add to business courage, integrity, competency, perseverance? In a word, to business efficiency?

The library as a business asset is not any collection of books and pamphlets under any custodian and handled probably more often by the janitor than the manager.

At no time in the history of the modern business world, has the opportunity been so favorable for a lasting alliance between the library and business. Business wants its own technology; it wants pamphlets, clippings, reports—all sorts of special things which no public library with all its other obligations could ever hope to get and to classify.

If the library is to help business, it must be organized as business is organized. To get everything on a subject may be necessary for some purposes, and is always interesting to the bibliographer; but to get the adequate thing is the business librarian's ideal of service, and if he misses it he may wake up surprised to find his labor unappreciated.

Business is multiplying short cuts, motion savers, "efficiency" getters in every department; it will tolerate nothing less from the library. It is for the library to prove its value—to demonstrate its practical worth by adjusting itself to the business environment. It must not follow too closely the traditions of general library work. It ought to be familiar with general library methods; but it should never lose sight of the fact that general library methods were devised with an eye single to general library problems. The problems of a business library are different.

Finally, how are the library and business to cooperate for their mutual advantage? It is evident that in this respect business has to perform a duty even greater than we have laid upon the library itself. If the library is under obligation to adapt itself to the needs of business, business is under special obligation to place its resources more completely at the disposal of the library. It must take the library seriously and plan for it accordingly.

Business fails to appreciate the ally that it might in the well conducted library. It appreciates and at times is mildly grateful for the library's services; but it has shown no great discernment when it came to an understanding of the means by which the service was rendered. It asks for and expects results; but has little appreciation of the price at which results must be bought.

An indispensable requisite of a business library is a librarian thoroughly conversant with the main facts of the business. He must know its theory and history. He must be freed from routine at least to the extent necessary to enable him to become an expert in the materials which he handles. He must be treated as a literary adviser and given the opportunity to develop literary discrimination and judgment in the field which he covers. Then he becomes more than a custodian of books; he is a counsellor, impressing his personality upon a unique source of business inspiration, namely, the business literature of his collecting, and bringing direct to his superiors the information which they will know how to use for the good of the business as a whole.

Subordinates, working under him, will assemble, classify, card index, bulletin and distribute, while the library itself will stand on a level with manufacturing, accounting and selling. It will be a department of the business, organized like other departments, for efficiency.

Business has already awakened to the possibilities of library help, and wherever it has done so with insight and courage it has answered for itself the question which we have here proposed. In banking, in finance, in engineering, in applied chemistry, in insurance and in numerous other fields, business has set itself to the task of adapting library methods of business needs. Special collections administered for special requirements are springing up in every large city, and the liberality with which these are beginning to be supported is in some respects an indication of business' own estimate of their value.[*]

"It's easy enough to be pleasant,
 When the world rolls on like a song,
But the man worth while is the man who can smile
 When everything goes dead wrong."

Building permits issued in 123 cities of the United States for September aggregated $55,650,660 and for 49 cities in Canada reporting building statistics, the value of building was $21,087,644. For the first nine months of the year the total building operations reported in the Dominion amounted to $155,270,040, while for the same period in the United States and for an average of about 130 cities the total value is $685,254,852. In view of the fact that the United States have a population approximately ten times that of the Dominion the showing is highly creditable to Canada and is illuminating as to relative advancement.

Water sterilization at Erie, Pa., is being carried on by means of hypochlorite treatment. In the 1911 report of Mr. J. S. Dunwoody, chemist, it is stated that the amount of available chlorine added to the water has varied from 0.25 to 0.35 part per million, equivalent to from 6 to 8 lb. of the dry hypochlorite per million gallons of water. It has been found that with the hypochlorite of lime averaging 36 per cent. of available chlorine, 7 lb. of chemical per million gallons will sterilize the water in its worst condition. The average cost of operating the sterilization plant, together with the maintenance of the laboratory, was approximately $1 per million gallons of water treated during 1911.

The Scotia Dam of the New York State Barge Canal, officially known as Dam No. 4 and Lock No. 8, and one of the numerous movable dams along the Mohawk River portion of the canal, will, according to the Engineering News, have foundations placed with pneumatic caissons. The bed rock at this point is 65 ft. below the level of the river, which is subject to rises of from 17 ft. to 20 ft. several times in the year. In view of these facts it was thought impracticable to attempt to build the dam by the ordinary open cofferdam method, and the 726 ft. length is to be built in a line of twenty-four pneumatic caissons joined together after the method used in the final construction of the foundation of the Hauser Lake Dam in Montana. The caissons will be built of reinforced concrete.

Derailment on curves is discussed in a paper by Mr. Arthur Rogers published by the Institution of Civil Engineers, in which the author reaches the conclusion that a locomotive is likely to overturn at a critical velocity lower than that at which the overturning will be caused by centrifugal forces alone. He points out that under certain conditions, where centrifugal forces are likely to cause overturning at 71 miles an hour, the effect of the drawbar pull and of unbalanced forces in the locomotive is to make the curve dangerous at 53 miles, particularly if brakes are applied. He also concludes that superelevation should never begin on a tangent, since its effect is to set up a lateral swaying of the locomotive which, on reaching a sharp curve at high speed, may reduce the adhesion between the inner wheels and rail enough to cause derailment.

The Egyptian lock, states the Ironmonger, was an assemblage of wooden pins or bolts. It is possible that this suggested to Bramah his remarkable invention. The Roman lock was practically a padlock; and it seems probable that the key was of Greek origin. In Latin countries the locksmith never confined himself to mere door furniture. At the very beginning—as nowadays in France—his art embraced all the wrought ironwork which serves to close and secure our dwellings, from a monumental garden gate and railings to a simple latchkey. That art reached its apogee about the fifteenth or sixteenth century, so far as the former class of work was concerned. Some mediaeval specimens—the hinges of the doors at Notre-Dame, for instance—are so remarkable that envious and humorous contemporaries have not failed to hint that the smith who executed them must have sold his soul to the devil.

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[*] Condensed paper by D. N. Handy before the Libraries Association.

The Great Harbor Work at St. John, N.B.

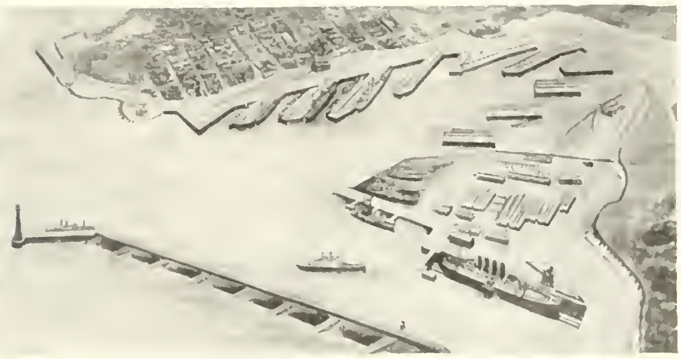
Progress Report and Details of Construction which Involves the Expenditure of Thirty Million Dollars—General Activity in the Maritime City

WORK involving the expenditure of $12,500,000 within five years and ultimately of $30,000,000 was begun last spring at Courtenay Bay, the eastern harbor of St. John, N.B., which has not hitherto been utilized for shipping purposes. The work is one of the biggest and most important in progress in Canada at the present time, and is in addition to extensive work being done by the federal government and the Canadian Pacific Railway in the western harbor of St. John. Messrs. Norton Griffiths & Co., Ltd., have contracted with the Dominion Government to do the dredging and construct a breakwater and wharves, providing berths for four steamships, at a cost of $7,500,000, and they have also engaged to construct and operate a dry dock at a cost of $5,000,000. The plans for the dry dock provide for a structure 950 ft. in length, but new plans have been made and a determined effort is being made to have the length extended to 1,150 ft.

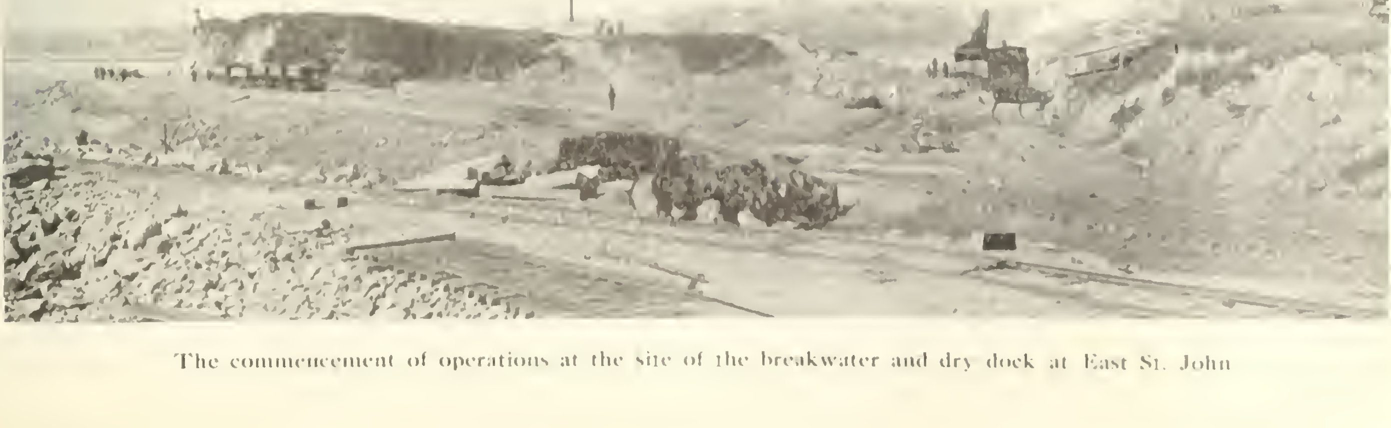
The Courtenay Construction Company, organized by MacDonald & Doheny, an Ontario firm, has taken from Norton Griffiths & Co., Ltd., a sub-contract for the excavation work and the stone for the breakwater. Work was begun on May 29th and has progressed very satisfactorily. The plant now assembled at the works and in operation is the most extensive ever used on a contract in New Brunswick. It includes five locomotives, two steam shovels, three locomotive drills, one locomotive crane, one steam derrick, ten steam drills, eighteen side dump cars of 7 yards capacity, and eight air-dump steel cars of 20 yards capacity, a machine shop, blacksmith shop and two large boarding camps. About two hundred and fifty men are at present engaged, and the progress made is ahead of the estimate of the construction company. The breakwater is to be 4,770 ft. in length. The first 2,770 ft. is to be of rubble stone with the sides covered with stone blocks of 2 to 5 tons. Then for 1,400 ft. the structure will be composite, with crib-work next the harbor and stone on the side exposed to the sea. The balance will consist of a sub-structure of crib work in 35 ft. of water with a reinforced concrete superstructure. There will also be groynes 150 ft. long at right angles to the breakwater, at intervals of 800 to 900 ft., to serve as wave breakers. They will consist of a row of birch piling in the centre, banked on each side with stone.

The dredging to be done in connection with this work is very extensive. Owing to the variation of the tide at St. John it will be necessary to dredge a channel, and then the whole basin within the breakwater. To carry out this work the Norton Griffiths Dredging Company has been organized with a capital of $1,250,000. It will have one elevator dredge and one dipper dredge at work this winter, and two more will be set at work next spring. The elevator dredge, a very large and powerful machine, has lately arrived, and the dipper dredge will soon be received.

The two wharves which are to provide berths for four steamships are to be constructed on the opposite or city side of the bay from the breakwater and dry dock. It will be necessary at that point to do considerable reclamation work, and a large amount of dredged material will thus be disposed of. It is also proposed to reclaim a large area on the east side of the bay above the dry dock, to be used as the site of a great steel plant. Norton Griffiths & Co. are very strong advocates of the erection of such a plant, which would be of great value in connection with their dry dock, and it is regarded as practically certain that the plant will be established. It is of course the intention of the government to dredge out the whole of Courtenay Bay, and erect more wharves; for the Atlantic terminus of the Grand Trunk Pacific Railway



Plan of East St. John Harbor, indicating the complete scheme with breakwater, dry dock and wharves



The commencement of operations at the site of the breakwater and dry dock at East St. John will be located there, the company having last year purchased 70 acres at the head of the bay for that purpose. Here also will come the Canadian Northern when it reaches down to St. John.

Another great reclamation scheme which would involve an expenditure of a million and a quarter for a sea wall, and would reclaim 90 acres of land from the tide at the extremity of the point of land shown in one of the accompanying illustrations, as a site for large industries, is being very strongly urged, with a good prospect of being carried out. Dredged material from Courtenay Bay could be utilized as filling, and an ideal site with both water and rail connection would thus be provided. The city council is being very strongly urged by business men to take up this work.

Norton Griffiths & Co., Ltd., have five years in which to complete their work, but state that they expect to have it finished earlier. The work is somewhat exposed for winter operation, but will be continued throughout the cold season. The rock is covered with 6 to 25 ft. of overburden, and the rock varies from shale to hard trap, but is easily blasted. There is a large stone quarry close to the scene of operations, from which stone is brought in cars for the breakwater. The largest amount of stone raised in one day thus far has been 2,100 yards. Mr. C. F. Palmer is the agent of Norton Griffiths & Co., Ltd., and Mr. James Gilchrist the engineer. Mr. C. L. Hervey is engineer for the Courtenay Construction Co. and Mr. Dineen superintendent for the Norton Griffiths Dredging Co. The federal government engineer watching the work is Mr. A. McN. Steeves.

Starting the 4,7770 ft. breakwater at East St. John—Courtenay Bay in the middle distance and city beyond

Other Large Projects at St. John

There is much other heavy construction work in progress at St. John, with the result that the demand for both skilled and unskilled labor is actually greater than the supply. The other work includes a grain elevator, two brush factories, an automobile factory, an armory, a very large theatre, two large warehouses, public work for the city, and extension of the street railway. Other large projects are under consideration, and the spring will see construction work begun on a new post office and a large bank building, while a million dollar hotel and several large apartment houses are expected to materialize during the next year.

The St. John Railway Co. is enlarging its plant to provide more electric power. The contract for three 500 h.p. boilers has been awarded to Babcock & Wilcox of Glasgow, and that for a chimney 150 ft. high with an inside diameter at the top of 7 ft. 6 in. to the H. R. Heinicke Co. Inc., New York. The contracts for the engine and generator have not yet been awarded.

The federal government proposes to establish a modern marine depot in St. John Harbor. The plans and specifications provide for dredging and the erection of a crib foundation with concrete superstructure. The crib-work will be 275 ft. on the northern side, 143 ft. on the harbor front and 188 ft. on the southern side. The dredged material is all to be deposited between the cribs but not as filling.

Hydraulic-Fill Dams

Hydraulic-fill dams are of comparatively recent origin, but since 1868, when Chabot built the 105-ft. Temescal dam at Oakland, Cal., numerous methods have been devised to increase still further the efficiency of an already economical means of handling earth and to adapt the method to all sorts of conditions, says the Engineering Record. In many places natural hydraulic-fill dams have been formed by glaciers, but it is not often that man has been able to utilize these dams and raise their height by sluicing in material on top of them as is being done at the Santa Maria Lake dam in Colorado. The lake is a natural narrow depression between high mountain ridges, with little drainage area tributary to it. The engineers, therefore, decided to build the diverting conduits and channel first and use the water to sluice in the material for the dam from a convenient area at one end of the structure. Of the interesting methods employed to carry, distribute and deposit the material may be noted the use of successive lines of sluices erected along the upstream and downstream slopes as the latter were built up by the deposited material. Openings at intervals of 12 ft. delivering over grizzlies permit the deposition of material close to the position required so that little hand placing is necessary. In fact, at times large material has been deposited on the outside shoulder of the slope to fill hollows. This is made possible by the use of the deflector gates, which might be termed small grizzlies, placed diagonally across the sluices to intercept and throw out the largest material. Deep riffle blocks made of local timber logs, not squared, have proved to be more economical than square ones. They pass about 70,000 cu. yd. of material before wearing so much as to require replacing. The drainage of the supernatant water from the pool of the dam has been accomplished in various ways on different projects. At Necaxa a concrete pipe with holes at short intervals carried the water down the side slope under the toe of the dam. In replacing the inflammable timber trestles for some of the railroads of the Northwest by hydraulic fills the engineers used wooden chimneys, one side of which was built up as the work progressed. At Santa Maria Mr. Jaycox has built a concrete flume up the side of one slope. Successive planks nailed to an embedded strip of wood raise the level of the pool as necessity requires. As to the solidarity of the central mass at Santa Maria, evidence has already been obtained that indicates close compacting and quick drainage. After drawing off the water to make repairs to one of the flumes the central portion easily supported the men, and even teams were driven over it.

The Canada Malting Company's Plant at Calgary

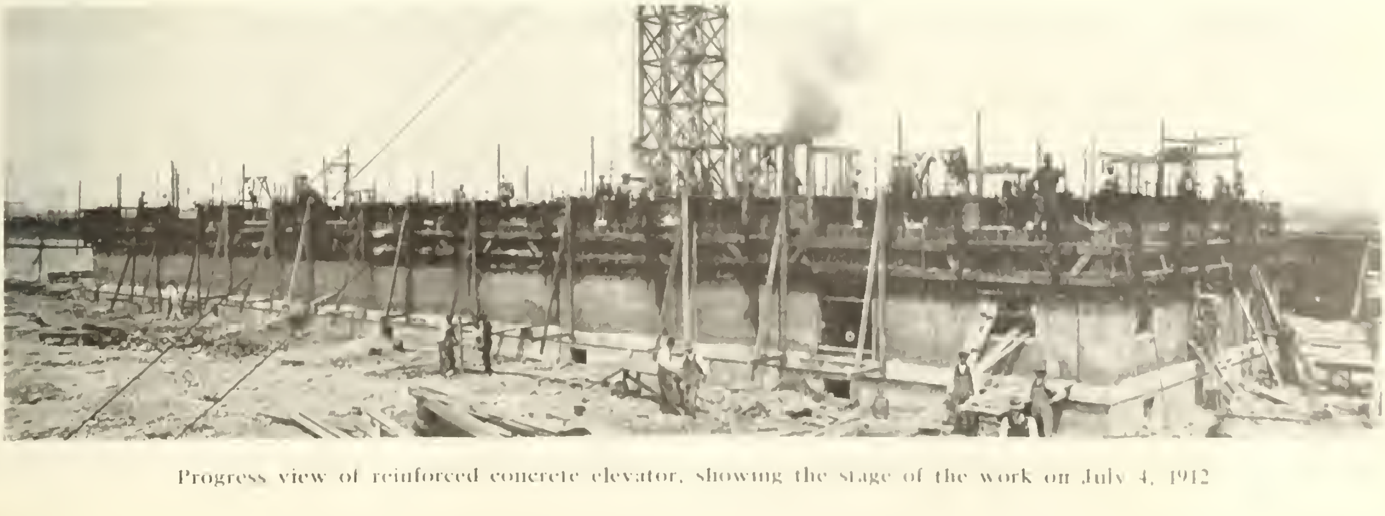
THE Canadian Stewart Company, Limited, have under construction in south-east Calgary a large malting plant and elevator for the Canada Malting Company, Limited, of Toronto. The accompanying photographs serve to illustrate the character of the work. The plant comprises two separate structures—a reinforced concrete elevator of 500,000 bushels capacity, and a solid brick and reinforced concrete malting house. The total amount of the contract will approach $500,000, with the addition of the contractors' percentage.

Canadian Malting Company's plant, Calgary—elevator building practically completed and operations well under way on the malting house From photograph taken September, 26, 1912

The elevator, which was constructed first, consists of a total of thirty-two bins, having hopper bottoms, the structure being 179 ft. 7 in. over all length, with a maximum width of 43 ft. 11 in. There are ten cylindrical bins, 21 ft. 0 in. in diameter, with a 7-in. thick shell, and nine cylindrical bins, 13 ft. 10 in. in diameter, with a 6-in. thick shell; the remaining bins are of varying shapes and sizes, with shells up to 9 inches thick. The cylindrical bins are all 90 ft. 0 in. above the foundations, and are all reinforced with horizontal hoops of flat steel, varying from 1¼ in. x ½ in. at the bottom of the larger bins, to 1 in. x ½ in. in the upper part of the smaller bins, all spaced 12 inches apart. Vertical rods are used for additional reinforcing and for tying rods. The Canadian Stewart Company, Limited, patented wooden forms were used for the construction of the circular bins, as well as for the end elevator. Concreting was done in two shifts of 12 hours, each 24-hour's run averaging about 4 ft. 3 in. in vertical height, the ninety feet being finished in twenty-one working days. The forms used are clearly illustrated in the photographs, as is the method of handling the concrete. A wooden tower hoist was used with a ½-yard Smith mixer. Concrete was dumped into a wooden hopper with iron gates, made on the job, and was wheeled in Ransome carts to the forms. There were about 150 men employed during the concreting, placing 6,500 cubic yards of concrete.

In the rectangular bins at the end of the cylindrical bins, there are two scale hoppers and garner hopper, all of steel plates and angles. The receiving hoppers under the railway siding are also of steel plates and angles, there being four compartments, made up of ¼-in. steel plates and 6-in. channels. The hopper bottoms of the concrete bins are all formed of slabs laid on a fill, supported by the slabs over the foundation walls. Along the top of the bins there is a double pent-house roof, 9 feet high by 26 ft. 4 in. outside. All the movements of grain are accomplished by belt conveyors. There are two 30-inch belt conveyors running beneath the bins for conveying to the malt house.

The malting building consists of the power plant next to the elevator, a large tower for the kilns in the centre, and beyond that a germinating compartment. This is a patented Saladin-Prinz pneumatic malting plant, designed by Otto Luebkert, architect, of Chi



Progress view of reinforced concrete elevator, showing the stage of the work on July 4, 1912 cago. It is fireproof insofar as the structure is concerned, being of solid brick walls, with reinforced concrete floors and columns. The power plant end is only one storey high, and contains the boiler room, engine room, pump pit, coal storage and office. In connection with the three boilers to be installed, there is being built a reinforced concrete chimney, 130 feet above foundations, 9 ft. 9 in. outside at the base, 5 ft. 0 in. at the cap. This chimney is being built by the Canadian Kellogg Company, Ltd., of Montreal, who are using their own patented steel form. The tower of the malting plant contains the kiln dryers and is six storeys in height above the ground, a total of 116 ft. 0 in. above grade; in plan 89 ft. 0 in. by 34 ft. 6 in. The further end contains the germinating compartments, and is three storeys, being 46 feet above grade, in plan 116 ft. by 75 ft. 0 in.

The cement and brick used in this plant are supplied by the Canada Cement Company, Limited, some 12,000 bbls. of cement and 1,300,000 bricks being required. Partition tiles of terra cotta were supplied by the Alberta Clay Products Company, Limited, of Medicine Hat, 35,000 being used. The elevator plant and the reinforced concrete for the malting house were designed in the Chicago office of the contractors, for whom Mr. W. F. Vatter is the local superintendent.

Canadian Malting Company's plant—July 25, 1912—Expeditious work of the Canadian Stewart Company on the cylindrical bins

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Clay products of the United States in 1911 had a value of $162,236,181, according to the United States Geological Survey, which has just issued a chart showing the total output by states of all clay products. The total production of common brick was 8,475,277,000 valued at $49,885,262. Of this New York contributed the largest amount, namely, 1,143,726,000, valued at $5,918,286. Illinois was second in output, with 1,074,486,000, but the product had the greater value of $6,126,911. No other state reached the billion mark, Pennsylvania coming third with 774,122,000 bricks. The chart also gives the figures of production for other kinds of brick—vitrified, front, fire, etc., as well as for terra cotta, draintile, sewer pipe, stove lining and pottery products. The production of all kinds of bricks was more than ten billion. In total output of clay products Ohio heads the list, with a value of $32,663,895, or one-fifth of the total for the United States; Pennsylvania is second, with $20,270,033; New Jersey third, with $18,178,288, and Illinois fourth, with $14,333,011.

Wind Pressure on Buildings

An investigation of the effect of wind pressure on the walls and roofs of buildings, with special reference to the suction effect on the leeward side, has been conducted by Albert Smith, professor of structural engineering, Purdue University. The methods employed in conducting this investigation and the results obtained were presented in a paper, from which the following notes are taken, read before the Western Society of Engineers. Professor Smith's observations were made on a model building with adjustable roof slopes, heights and lengths of walls, permitting of 27 different combinations.

The model building was erected with a south and southwest exposure on an unobstructed site of land of the Purdue School of Agriculture, Lafayette, Ind. The base section was made of 1½ in. plank, while the covering material elsewhere was plaster board. This was done to secure light construction that would permit of quick changing of size. The different combinations of size included lengths of 5, 10 and 15 ft.; wall heights of 4, 5 and 6 ft. and gable heights of 14½, 18 and 24 in.

Pressure Dynamometer

The pressure-reading apparatus was connected with the outer air through small holes bored in the wall and roof and in each of these holes a brass nozzle was screwed flush with the outside surface. On the inside end of these nozzles, ⅜ in. rubber tubing was attached, and these tubes were connected through a glass tube with a battery of bottles containing liquid. This battery was in turn connected with a graduated glass tube open to the air in the building, and the differences in pressure between the air within and without caused a proportionate difference in elevation between the liquid in the bottles and in the tube. The liquid was colored and consisted of two parts of water to one part of alcohol.

At one end of the building a thin plate or target, connected with a recording pointer and scale for measuring the intensity of the pressure against the plate was placed. This was designed to furnish a comparison between the intensity of the wind pressure on the thin plate and the pressure on the building surface at the same instant. It was found that the relation between these pressures was influenced by so many independent conditions as to render a comparison between them valueless. The velocity of the wind was measured by an anemometer.

The records taken consist of photographs of the recording apparatus in the building with various wind velocities. The fluctations of the liquid in the tubes was found to lag somewhat behind the variations of the wind intensity, due to the damping effect of the water column, but by careful observation of the pointer and scale, which proved to be very sensitive, flash-lights were taken immediately after the rapid increase of velocity of the gust had ceased and before the correspondingly rapid decrease had begun.

From these photographs pressure tables were compiled and the values obtained were corrected for measurable errors in the apparatus. From a study of the pressure diagrams and curves plotted from these corrected values, Professor Smith draws the following conclusions:

1. The increase of height of wall tends to decrease relatively the average amount of pressure on the windward wall. The decrease of wall height, while the roof height remains unchanged, tends to produce pressure on the windward roof. The pressures then do not pass through zero at the top of the wall, but at a point some distance up the roof, and the average on the wall is increased.

2. The increase of height tends to increase relatively the average amount of suction on the leeward wall. The direction of the filaments, as the air leaves the leeward slope, is evidently an important factor in determining the suction on the leeward wall. The more nearly horizontal the direction of these, the greater will be the leeward wall suction. But the longer the roof, in relation to the height, the more nearly will the air filaments at the leeward eave be brought parallel to it. Turning these filaments into a direction parallel to the surface of the ground, develops a higher absolute pressure and therefore a lower suction, than when the filaments are more nearly horizontal. Where the roof is long in comparison with the height, or, the span being constant, where the height is small in comparison with the span, the leeward suctions will be relatively small.

3. The relative amount of the air flowing around the end of the building increases as the height increases. When the building is short in comparison with its height, the flow of air around its ends has more influence upon the relative amounts of the pressures and suctions than the flow over the top. On a thin plate exposed in an air current, the maximum pressure is found on the windward side midway between two edges around which free flow takes place, and the minimum suction will be found on the leeward side directly opposite the same spot or line. As the amount of the end flow increases, the tendency of the leeward suction at the middle section to become a minimum increases as does the tendency of the windward pressures to become a maximum.

Revised Methods Necessary

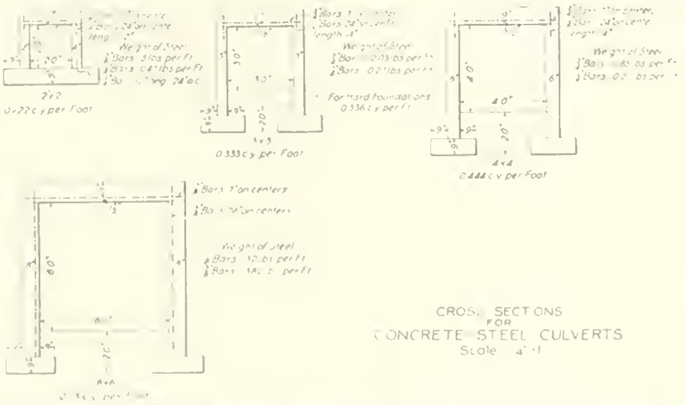
Professor Smith states in conclusion that, in view of these results, the ordinary methods of assuming wind loads on mill buildings should be somewhat revised. For the case of roof trusses on masonry walls, or on steel bents with long diagonals, a suction effect in the neighborhood of 0.4 of the unit wind pressure should be placed on the leeward roof of all closed buildings, and a pressure or suction derived from the curves drawn from the observations, placed on the windward roof. The resulting stresses will not only be different in amount from those computed on the present basis, but will in many members differ as to sign. Wind loads on purlins might in most cases be entirely omitted, and where considered they might be made much less than at present. The necessity for secure anchorage, not only to prevent sliding, but to prevent actual uplift, is strongly confirmed by these tests.

In buildings with knee-braced bents, in addition to the preceding points, the suctions on the leeward wall should be considered. Approximate curves might be made for each pitch and for each height ratio, and the leeward wall unit derived from them in any given case. This, beside being troublesome to the computer, still leaves his results inaccurate, since if the pressures on the two walls be unequal the points of contraflexure will be actually at different heights, though in view of the labor otherwise involved, he must consider them to be at the same height.

Where there is an opening as great as 2 per cent. or 3 per cent. of the outside surface, the suctions will be seriously reduced or augmented, according to which side the openings are on. If on both sides, the pressures and suctions will not be seriously affected, except locally, unless the openings are very much greater than this.

Systematization of Highway Design in Massachusetts

In order to facilitate the work of its engineers in the field and office the Massachusetts Highway Commission has prepared a considerable number of typical designs of highway structures and accessory details which are utilized as data sheets in cases where special conditions do not require departures from the established practice of the board. These typical designs are white-printed upon 6 x 11-in. sheets, perforated for binding and show the dimensions and material, usually to scale, required for the building of catch basins, reinforced concrete culverts, culverts with walls of dry rubble masonry and covers of concrete and steel, fences, forms for concrete culvert construction, typical post flanges, tees and crossings, and road sections for various locations and materials.



Typical small-scale sheet, Massachusetts Highway Commission

A sample sheet to indicate the character of the information is reproduced herewith.

The following approximate data for bituminous construction are included in the foregoing sheets:

Bituminous Macadam (Mixed).—One ton broken stone equals 10 sq. yds. 2 in. thick after rolling; 1 1/3 gal. bituminous material to each square yard; 18 gal. bituminous material to each cubic yard broken stone (loose), approximate weight, 2700 lb.

Bituminous Macadam (Grouted).—Lower course bound with sand or screenings; upper course 2 in. thick after rolling (grouted); 1½ gal. of bituminous material per square yard; wearing course, 0.015 ton of pea stone and 0.7 gal. of bituminous material per square yard.

Bituminous Gravel (Mixed).—One cubic yard equals 11 sq. yd. 2 inches thick after rolling; 1.3 gal. bituminous material to each square yard, 18 gal. bituminous material to each cubic yard (loose), surface treatment, by spraying machine, 0.3 gal. of oil or tar and 0.016 cu. yd. of broken stone or gravel per square yard.

Brick Roadways and Their Construction

Requirements of Ideal Roadway Fulfilled by Brick — Success and Ultimate Economy Dependent Upon Proper Construction — Practical Directions*

PERMIT me to state briefly what I believe constitutes an ideal roadway. It is a pavement which wears smooth and clean and needs no care-taker to keep it in repair, no matter what the character or quantity of traffic which passes over it; a pavement which is weather-proof, flood-proof, dirt-proof, wear-proof, and so practically time-proof; a pavement which affords an open and easy highway from country to city every day in the year for any and all sorts of traffic; a roadway over which pleasure vehicles may speed with safety to the driver and without injury to the vehicle or pavement; a roadway over which heavy service auto trucks may draw loads of several tons at a speed rivaling, if not exceeding, that of the so-called fast freight trains, without damage to the truck or the roadway; a roadway over which the farmer may easily haul with one horse what requires a team on ordinary roads, or with one team as much as two teams will commonly haul; a pavement over which one may journey in comfort, for it is a dustless pavement.

1—Columbus Avenue, Sandusky, Ohio. One mile in length, all of which is just as smooth as the section photographed. Laid in 1894—eighteen years of service without any cost for repairs.

Do I exaggerate when I say such a pavement is an ideal pavement? That is precisely the kind of a pavement you can construct of vitrified brick, and that, too, at a cost but little more than is now being paid for our temporary roadways. When you consider that the only cost of such a pavement is its first cost, you must admit that ultimately it is the cheapest pavement you can build.

Eighteen years ago there lived in Sandusky, Ohio, a wise and painstaking engineer, Mr. John W. Miller. Under his direction a mile of brick pavement, part city street and part rural road, was laid, extending from the center of the town out into the suburbs. Over this pavement during all these years has daily passed much traffic. To-day the pavement is perfectly smooth from one end to the other. (Plate 1.)

Fortunately, while this pavement has been torn up at times for the laying of gas mains, water pipes, etc., it has, luckily, always been replaced as carefully as it was originally laid, so that to-day it is as good as any new pavement. As you know, most pavements are damaged irretrievably by being torn up, but when such work is done properly, no harm is done to a brick pavement, as demonstrated in this case. During these eighteen years not one dollar has

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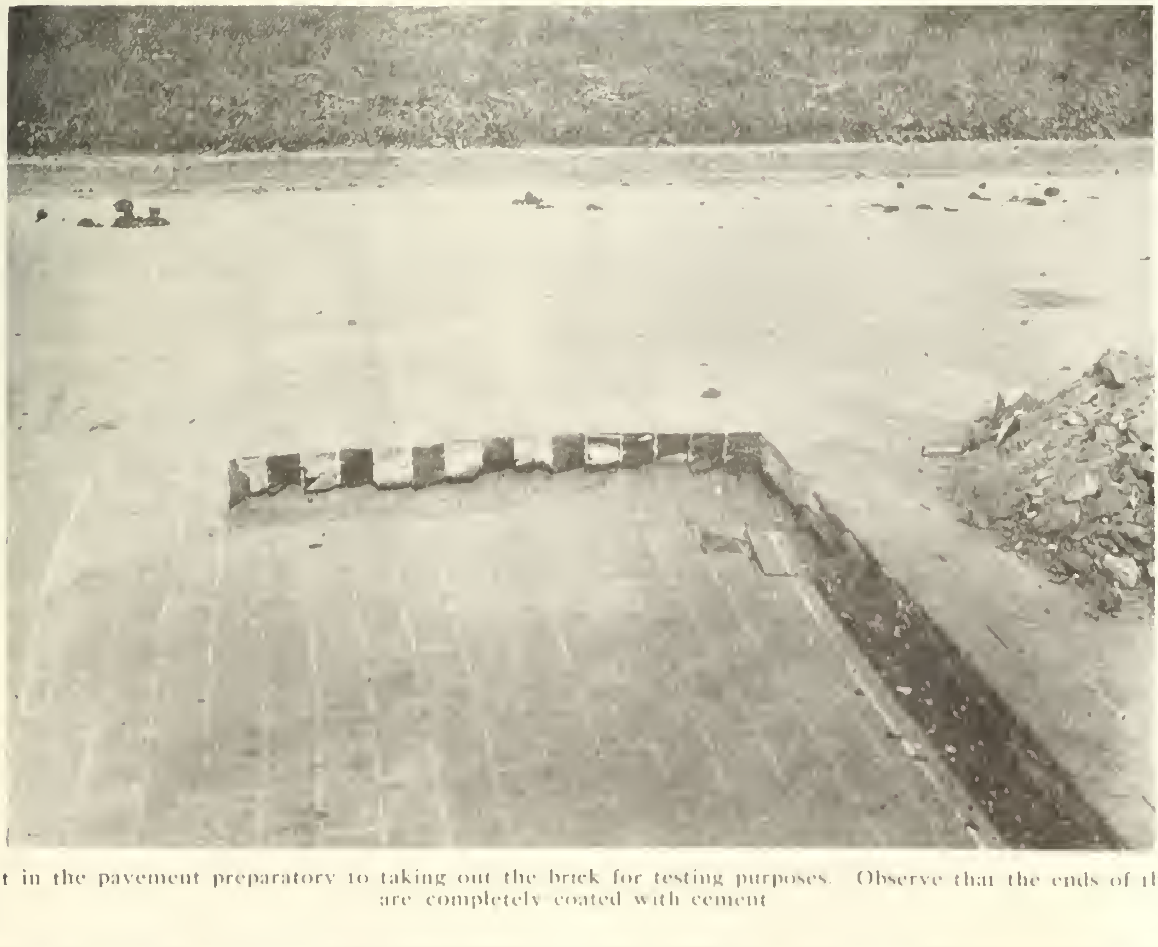
* Abstract of an illustrated paper delivered before the American Road Congress at Atlantic City on October 5 last by Mr. T. A. Randall, Indianapolis, Secretary National Brick Manufacturers' Association.

2—The section (this side of white line) of Columbus Avenue taken up for inspection.



3—A cut in the pavement preparatory to taking out the brick for testing purposes. Observe that the ends of the brick are completely coated with cement been spent on this pavement for repairs; yet it is still an ideal roadway and bids fair to continue such for another twenty years, or perhaps twice that length of time. I hear some of you say it is an exceptional pavement. That I concede. Why it is an exceptional pavement is told in two words, *proper construction*.

There are plenty of poor brick pavements, poor chiefly because of poor construction. I took this particular street as an illustration because of the comparison it affords.

It is a portion of the main business street of Sandusky, and was paved the same year (1904) as the other roadway, and with brick of the same grade, but evidently with much less care in the method of construction. To-day it is a rough and undesirable pavement. This pavement was laid under the same specifications as the good pavement, but some minor but very essential details of construction were carelessly slighted. Mr. Will P. Blair, Secretary of the National Paving Brick Manufacturers' Association, of Cleveland, Ohio, and others who have been studying this subject for some years, determined, if possible, to learn the real cause of failure in one pavement and the remarkable success in the other. Accordingly, experts recently visited Sandusky, and, with the cooperation of the city engineer, had a stretch of some fifty square feet of each pavement, the good and the poor, taken up. (No. 2.)

The good pavement was perfectly bonded from top to bottom, every course of brick was intact, just as when it was first laid. The foundation was right to begin with, and there was a two-inch sand cushion thoroughly compressed, affording a smooth even bed for the brick, and insuring a comparatively noiseless pavement. The cement filler had been so applied that both sides and ends of each and every brick was imbedded in it. You will see by the pictures (No. 3) that the brick and cement formed a solid mass, making the pavement monolithic in character. (No. 4.) The result was a perfectly smooth, unbroken surface. From one end of the street to the other, there has been no chipping of brick, or disintegration of the cement filler or binder. A close inspection of this mile of eighteen-year-old pavement, made late in August, did not disclose a single defect. The traffic over this pavement has had no perceptible effect upon it, the pavement showing scarcely any wear at all. If left undisturbed this pavement will be just as good at the end of another eighteen years, without a dollar of expense for upkeep.

How fared the other pavement? (No. 5.) Its record is that of many of our city streets, and is thus tersely described by an unknown poet:

A CITY STREET

They took a few old brick, and they took a little tar,
With various ingredients imported from afar.
They hammered it and rolled it, and then they went away—
They said they had a pavement that would last for many a day.

But they came with picks and smote it to lay a water main,
And then they called the workmen to put it back again.
To run a railway cable they took it up some more,
And then they put it back again just where it was before.

They took it up for conduits to run the telephone,
And then they put it back again as hard as any stone.
They took it up for wires to feed the 'lectric light,
And then they put it back again, which was no more than right

Oh, the pavement's full of furrows, there are patches everywhere;
You'd like to ride upon it, but it's seldom that you dare.
It's a very handsome pavement, a credit to the town,
But they're always diggin' of it up, or puttin' of it down.

The section of the poor pavement taken up disclosed the secret of its failure, if a pavement can be called a failure which after eighteen years of use is, though rough, still doing service, with no expense incurred for repairs. As a fact, it is a failure only by comparison with the perfect pavement. The same grade of brick was used in each pavement and the traffic is much the same on each street. Why the difference? The answer is easy. It is in the careless construction of one, and the careful construction of the other.

An Instructive Comparison

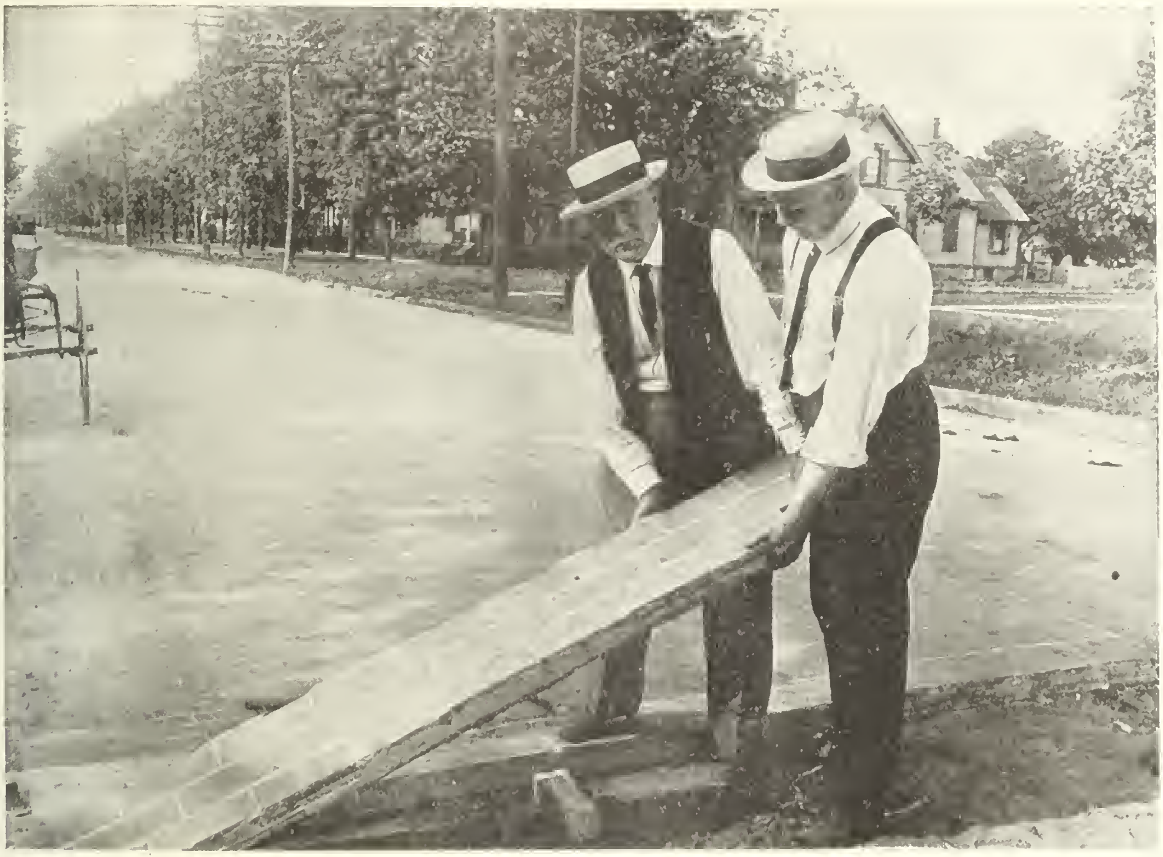
In the good pavement, the cement filler was properly applied. In the poor pavement not half of the brick were imbedded in the cement. (No. 6.) Some of the brick had cement on one end, and not on the other; some of the brick had cement on the upper portion and little, or none, on the lower, and vice versa. In some small portions of the removed pavement you can see the cement was properly applied. In such portions, the pavement remained smooth; where there was little or no cement, the pavement was the roughest. (No. 7.) To my mind, this investigation solves the mystery of good and poor brick pavements. Scientists are at work on the problem and in time a full report of the finding will be made public. I feel quite confident that the report will justify the opinion I have expressed.

Some may say that this stretch of perfect pavement was an accident, and that it cannot be duplicated in building country roads under ordinary conditions. Come with me now for a little tour over the country roads of Cuyahoga County, Ohio, and see a few of the many examples of similar ideal pavements. They have learned how to build brick roadways in Ohio. Every detail of construction is looked after carefully, no feature of the work is slighted, and, as a result, the roads are so perfect that it takes an expert to detect any minor faults or defects even. They have over four hundred miles of brick roads in Cuyahoga County alone, and those who use them regularly and appreciate their excellence and economy, demand brick pavements, and brick pavements only.

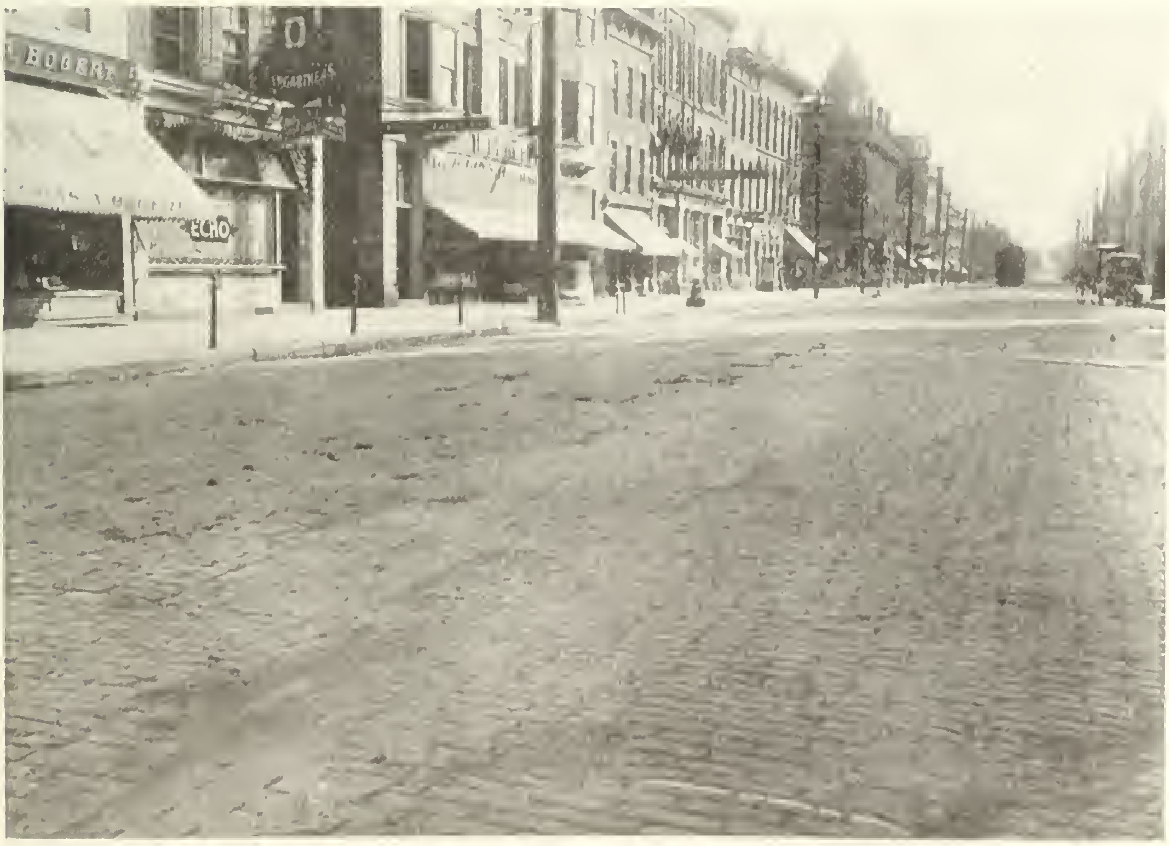
How to Construct Good Brick Roads

The proper construction of a brick-paved roadway is a simple matter. In general, the requirements are the same as maintain in the building of any good road. Here is the formula: 1—proper drainage; 2—the careful compacting of the roadbed to a grade corresponding with that of a finished street; 3—a concrete foundation in the colder climates, and on soils of slow drainage; 4—a sand bed, two inches in depth, evenly compressed, intervening and immediately underneath the brick; 5—laying the brick best edge up, with lugs lying in the same direction; 6—rolling the brick to an even surface; 7—application of the cement filler in proportion of one to one; 8—protecting the filler from too rapid setting.

I prefer, rather than enter into the details of construction, to give you evidence of what may be accomplished in conforming to the details of these directions, and submit for your consideration as to whether or not they are of immediate and insistent inter-



4—A section of the pavement which illustrates its monolithic character, due to the perfect application of the cement filler



5—Market Street, Sandusky, Ohio. Paved in 1894 with the same character of brick as those used on Columbus Avenue. The difference in wearing quality of the pavement is due to defective construction.

est to the road users and taxpayers of this country.

I want you to know that a properly constructed vitrified brick roadway is the ideal highway from all view points. Its merits summarized are: it is easily built; it is economical as to first cost; it costs nothing for maintenance; it is most satisfactory in use; it is the most satisfactory pavement known; it affords the least traction resistance; it is not a slippery pavement even when wet; it is adaptable to all climates and all conditions of soil; it is not an experiment, but a demonstrated fact; it may be seen and inspected, hundreds of miles of it, in actual use, successfully withstanding excessive traffic.

Its affirmative merits are many, and, when the truth is told, there is not one single objection that can be urged against its use for the heavy traveled highways of this country.

For the foregoing reasons every road builder in the land should familiarize himself with our brick roadways and their methods of construction. Those of you who can do so will find it both a pleasant and profitable experience if you will visit Cleveland, Ohio, and make a personal inspection of the brick-paved streets and roadways of that vicinity. Call at the headquarters of the National Paving Brick Manufacturers' Association and let some of its representatives take you for a spin out into the country.

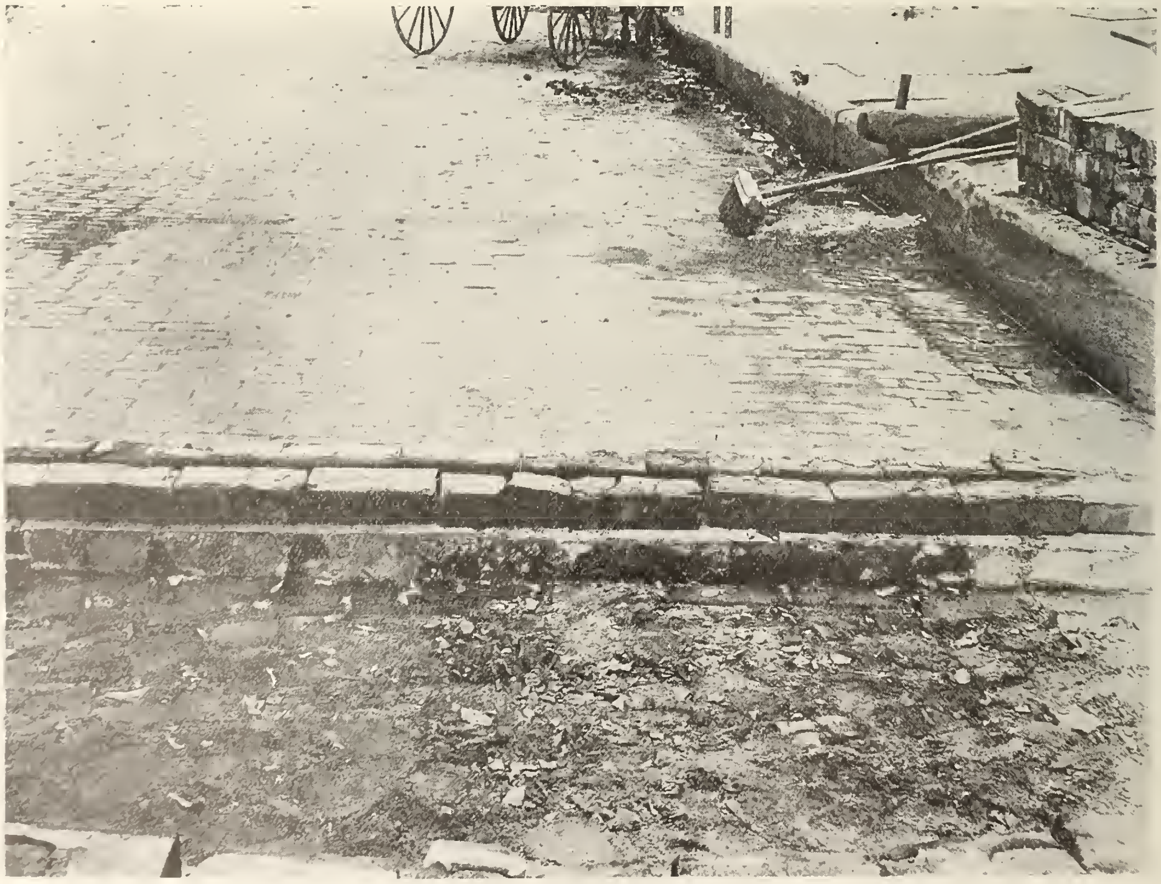
Brick Roadway the Dustless Roadway

You will be surprised by one feature of these brick-paved country roads: their cleanliness. It is not an uncommon thing for visitors making such a trip for the first time to ask how often the roads are swept. The answer is, "They are swept constantly, but Dame Nature does the sweeping, and she uses no broom." The wind keeps them as clean as the dear old board walk out here that we all love and enjoy.

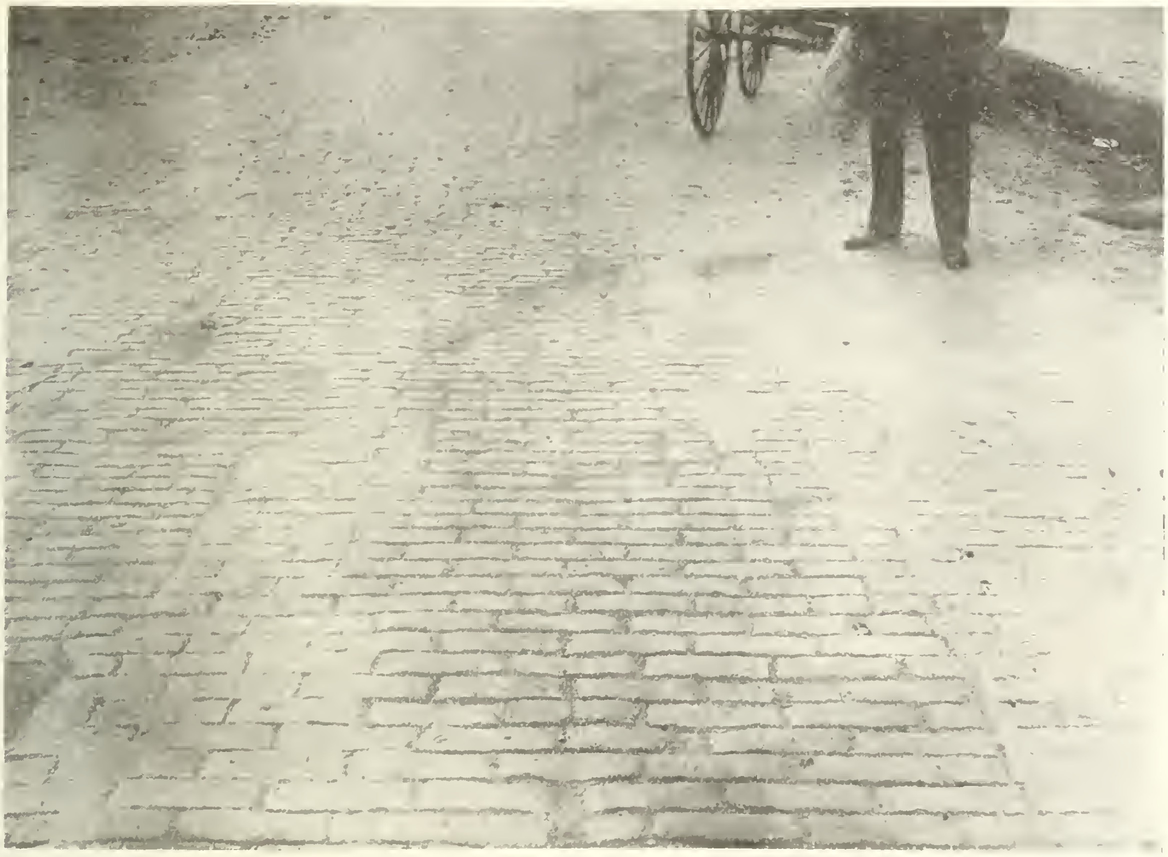
In time, brick roads will become universal throughout this country, for there is an abundance of raw materials, shales and clays from which vitrified brick may be made. In sections where paving brick are not now made they can be shipped in, as transportation charges are not prohibitive. On the contrary, brick and cement can be supplied to almost any district in the land at a reasonable price, and the other materials used are found everywhere almost. Indeed, one of the commendable things about brick roadways is the fact that common labor is used in building them, and home products are chiefly used in their construction. They are not a drain on local capital; on the contrary, they stimulate local business by affording employment for labor at fair wages. In short, brick-paved roadways are desirable and commendable from every viewpoint.

Hamilton's latest hotel project is being promoted by the United Hotels Company, which is contemplating an expenditure of $900,000, according to a report from the Ambitious City.

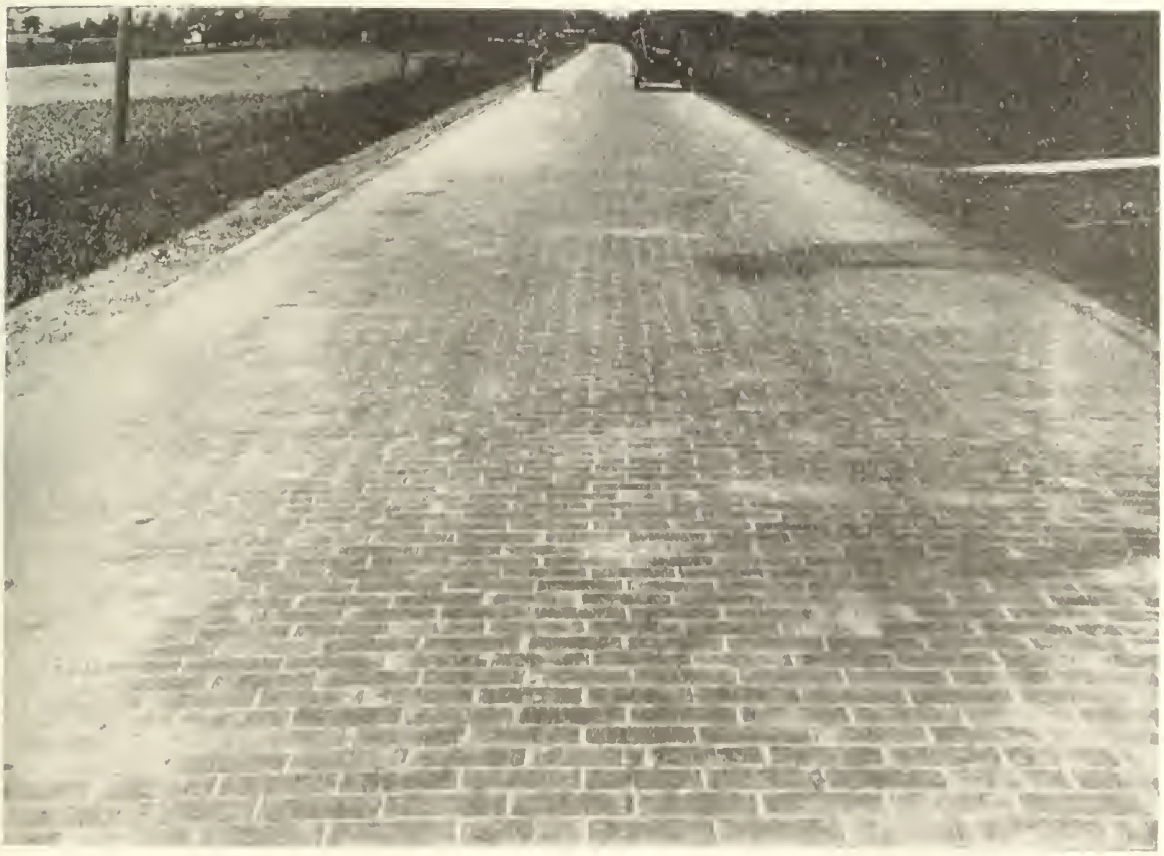
The period set by the Government during which half of the duty should be remitted upon cement imported into Canada, expires on October 31, and after that date it is almost certain that there will be no remission of duties paid.



6. A cut in the Market Street pavement, showing the imperfect application of the cement filler, to which is due the uneven wearing quality of the pavement.



7—A section of Market Street at close range, showing that some portions of it are smooth. At such points the cement filler was properly applied, perhaps by accident.



8—Glenwood Road, six and one-half miles out from Buffalo, N. Y. A fine stretch of pavement constructed in 1911. Wire-cut-lug brick used. Photographed June 8, 1912. Photograph was not retouched, but shows the pavement exactly as it appeared at the latter date. Note the brick are not chipped at all.

The Master Builders' Association of Vancouver, B. C.

THE Master Builders' Association of Vancouver was organized during the progress of the strike in April of last year when the whole of the building trades demanded an increase in wages amounting to from 25 to 50 cents a day. At the invitation of the Norton Griffiths Company a number of firms got together with the idea of organizing in such a way as to be able to present a united front to the trade unions. These firms, which represented eighty per cent. of the contracting interest of the province, included Messrs. Smith & Sherborne, Messrs. Skene & Christie, Messrs. McDonald & Wilson, Messrs. Baynes & Horie, Mr. J. J. Dissette and Messrs. Booker, Whipple & Campbell.

Under the direction of the new association the strike was terminated in July of last year. Immediately afterwards the various sub-contractors formed associations, these including the Marble Association and the associations of the plasterers, tinsmiths and painters. The master-builders were also responsible for the organization of the Association of British Columbia Architects, which at the present time has a membership of 90 per cent. of the profession in British Columbia.

Mr. F. W. Nicholson, Vancouver

Now that the horizon is temporarily clear from labor disputes the architects and builders are co-operating with a view to obtaining improvement in contracts, specifications and all matters of mutual interest. The contractors of Vancouver were greatly strengthened by the formation of the Master Builders' Association. After the strike the Association refused to recognize any of the trade unions or their delegates, and this condition still obtains. The members of the Association do not permit any trade union delegates to visit their works and discuss matters with their men during working hours, while the Association is also at liberty under these Articles to employ any man irrespective of whether he is a trade union member or not.

Mr. F. W. Nicholson, whose photograph is reproduced herewith, was the first president, in 1911, and was re-elected for 1912. At the 1911 election Mr. Booker became vice-president and Mr. J. J. Dissette, secretary. The secretary this year is Mr. Skene, while Mr. Booker is still vice-president. A select committee of the Association has been appointed to confer with the architects with a view to arriving at standard forms of contract and specifications.

Comparative vibration tests on reinforced concrete floors, and others built of steel framing with jack arches of brick work between the beams, have been carried out by the Paris and Orleans Railway. The floors were designed to support equal loads and were tested by dropping heavy weights on them and measuring the time and amplitude of the vibration. The results showed that the vibrations in the floors of steel and brick construction were about twenty times as great and lasted eleven times as long as those recorded for the reinforced concrete floors.

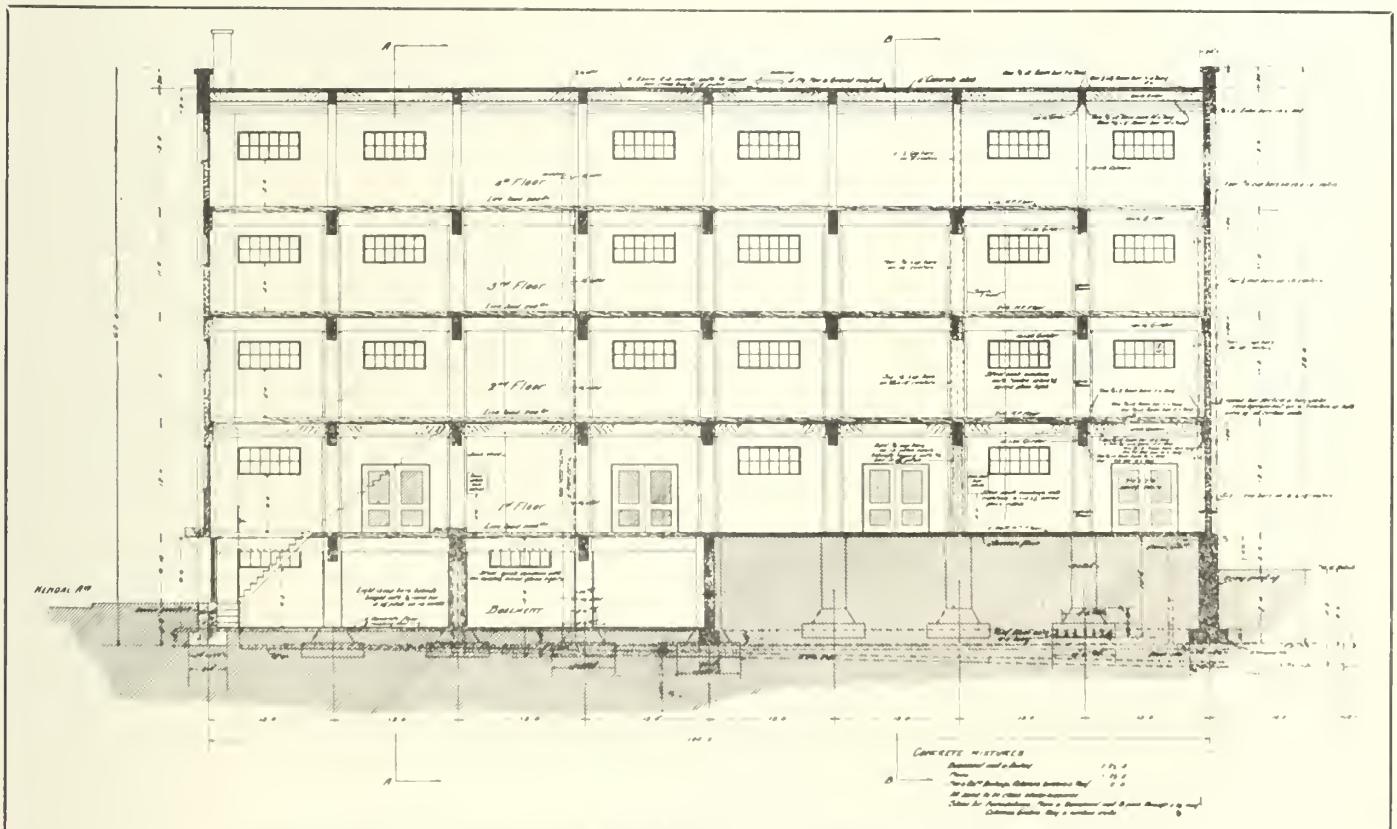
Motor trucks for water-works service are used at Detroit, Mich. The Board of Water Commissioners of that city in its annual report states that it has in use three two-passenger automobiles, five small auto-trucks and twenty-four horse-drawn vehicles. Up to the present time the use of automobiles has been somewhat of an experiment, but the city has expanded to such an extent that it has been necessary, if the work is to be carried on economically, to use automobiles or establish branch yards in various parts of the city. The latter plan will probably become necessary in Detroit within a few years, but at present according to the report, it is believed that the use of motor-trucks for long hauls is less expensive than would be the operation and maintenance of several branch yards.

An oiled gravel road 7262 ft. long, 16 ft. wide for seven-tenths of its length and 20 ft. for the remainder, has been constructed at Boise, Idaho, under the direction of the Office of Public Roads, which has given out the following cost records in the report of Director Logan Waller Page for the last fiscal year: The subgrade was very dusty and the No. 1 stone was placed directly on this dust for a depth of 6 in., filled with sand and rolled with a 12-ton steam roller. The foundation course was river gravel, ranging in diameter from 2½ to 1½ in., and 50 per cent. of it had been crushed. A wearing course of crushed gravel, varying in diameter from 1½ to ½ in., was next applied to a depth of 2½ in. loose; this was rolled and remained some time before the oil arrived. In the meantime, therefore, the wearing surface was harrowed before the oil was applied. The records concerning the oil treatment deal with 1671 ft. only. The oil came from Port Richmond, Cal., and cost 2 cents per gallon, but the total expense, including the freight charges, raised this amount to over 11 cents per gallon. The oil was heated in the tank car and run into a distributing wagon of 500 gal. capacity, fitted with steam pipes. If was spread with a patent distributor at the rate of 1.75 gal. to the square yard. Sand was then spread over the road and the surface was rolled. In all, 3713 sq. yd. were treated, at a total cost of 28.83 cents per square yard. The labor cost $2 and teams $5 per day of eight hours.

Lake of the Woods Milling Company's Building, North Toronto

In the illustration reproduced herewith there is shown a longitudinal section of the new Lake of the Woods Milling Company's building, now being erected at North Toronto at the corner of Kendall avenue and the C.P.R. tracks, by Mr. J. H. Tromanhauser. The building is of special interest inasmuch as it is the first work carried out under the revised ordinance respecting concrete construction.

The building is 72 by 106 ft. in dimensions and contains 5 storeys, the total height above grade being 60 ft. Concrete has been used wherever possible, the columns, girders, outer walls and roof being of this material. The windows are wire glazed with steel frames. The floors are the only parts of the building where wood is used and the reason for this is that concrete is said to have a deleterious effect upon flour. The floors are 2 by 6, laminated.



Longitudinal section Lake of the Woods Milling Company's building, North Toronto

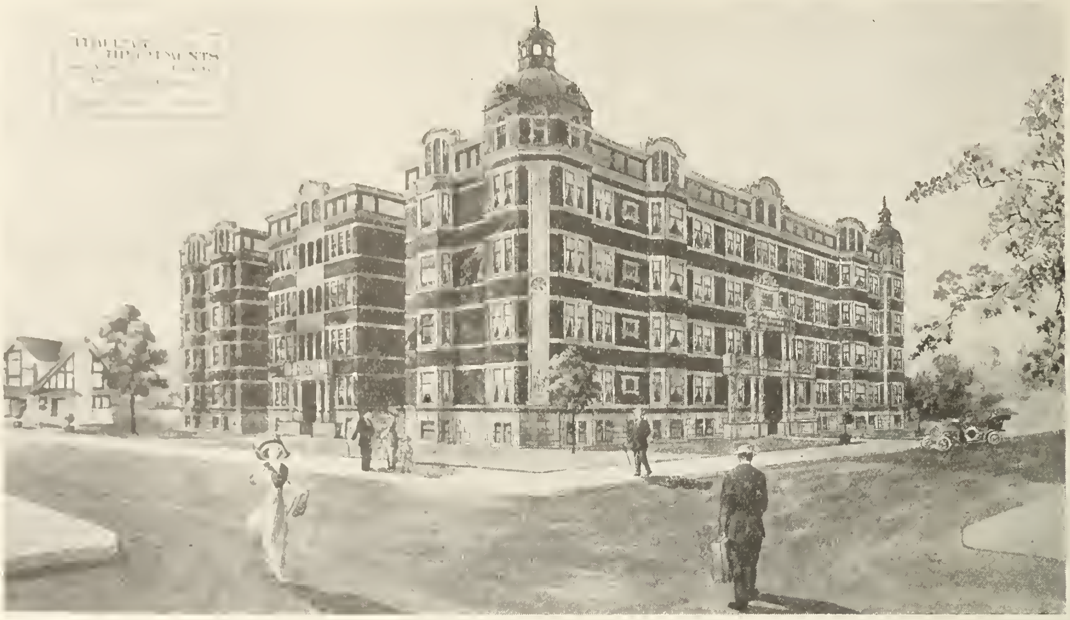
Throughout all storeys above the basement the columns, with the exception of the roof columns, are of the same size, this provision enabling the use of duplicate forms. The design and construction of the building throughout are noteworthy on account of their uniformity and simplicity.

The Lake of the Woods Milling Company will use this building for the flour warehouse for the Toronto trade. Two bag hoisting elevators will be installed and spiral chutes will be erected for loading into cars.

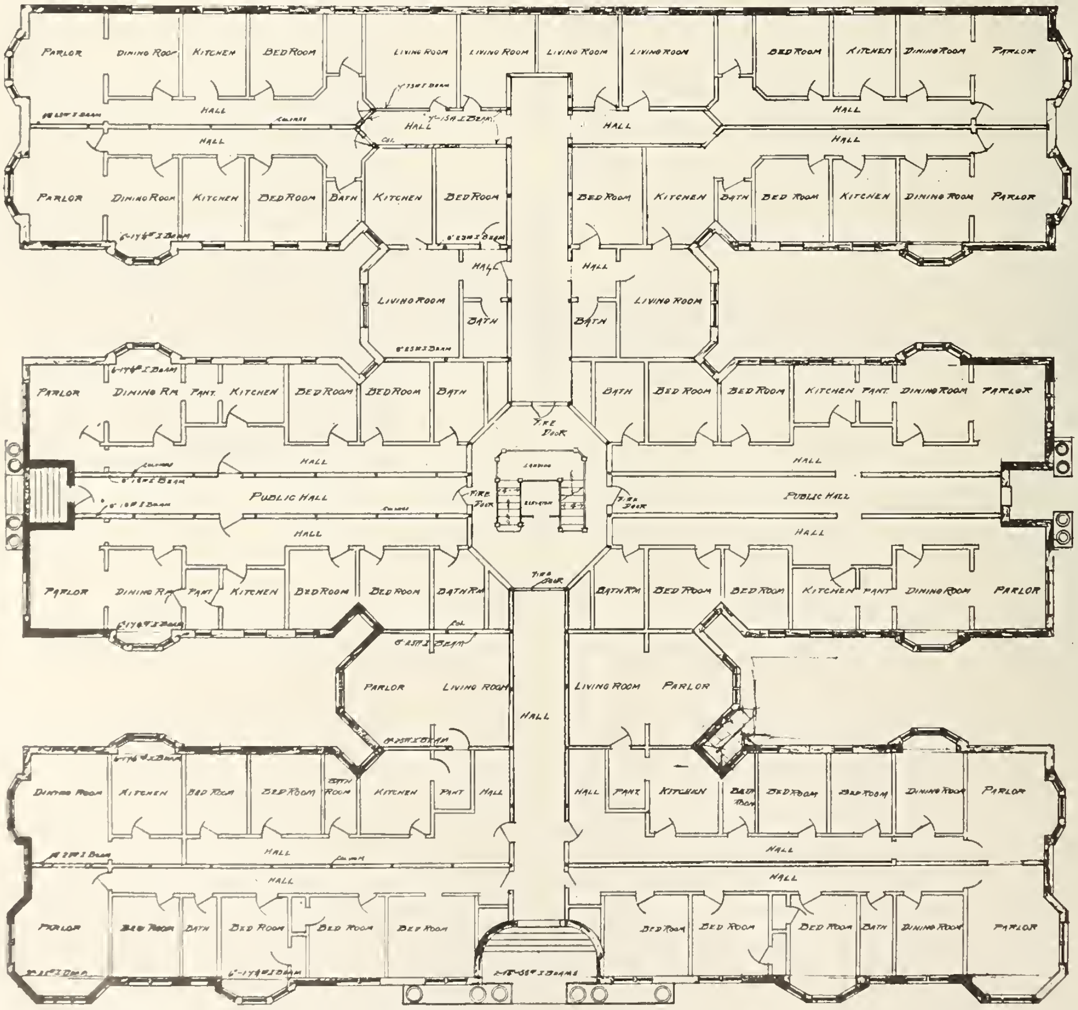
The estimated cost of the building is $40,000. It is expected that the structure will be completed this fall.

Tests on the soundness of cement conducted in England by Mr. H. E. Kiefer have shown that the presence of free anhydrous lime cannot be the sole cause of the failure of certain samples of Portland cement to pass the boiling test. According to Mr. le Chatelier the addition of 1 per cent. of freshly-calcined lime to a sound cement will render it unsound, but in Mr. Kiefer's experiments finely-ground lime was added in relatively large quantities, in one case up to 25 per cent, to samples without rendering them unsound. In all the cases tried, the quality of the cement was improved by finer grinding or by removing the coarser particles by sifting. In other experiments in which the unsound cements were exposed to moist air at 150 deg. Fahr., the absorption of from 0.1 to 0.27 per cent. of moisture sufficed to render the cements sound. It was found that when cement is allowed to stand either in a sealed jar or exposed to the air, the coarser particles become progressively finer, and it is considered probable that the seasoning of unsound cement consists in the disintegration of the coarser portion. Mr. Kiefer states that in this coarser portion free lime may be present encased in glassy particles, and the disintegration be caused or accelerated by heat and moisture. It has been found that the moisture need not be in sufficient quantities to hydrate the free lime, but merely to render the coarser particles sufficiently fine to permit hydration before the cement has set.

Ventilation by individual air ducts has been tried at one of the public schools in Minneapolis. The air was discharged through individual funnel ventilators placed beside each desk. It was found in experiments extending over a period of four weeks that satisfactory ventilation could be maintained in this way by supplying only 8 cubic feet of air per minute per pupil as compared with 30 cubic feet required under the ordinary fan system of ventilation.



Perspective View and Typical Floor Plan of Apartment House to be erected on Grosvenor Street, Toronto, at an estimated cost of $400,000. Architects, Messrs. Mallory & Thatcher.



TYPICAL FLOOR PLAN

Modern Apartment House, Grosvenor St., Toronto

PLANS have been completed by Messrs. Mallory & Thatcher for an apartment house at the corner of Grosvenor Street and Surrey Place, Toronto, which will probably be one of the largest buildings of its kind in that city. The building is now under construction and operations have reached the third floor. The area of this building will be 150 ft. by 160 ft. and the structure will consist of four storeys and basement. The frame will be of structural steel furnished by the Toronto Structural Steel Company, with an exterior of pressed brick and stone. The foundation will be of concrete, and from the grade line to the first floor stone will be used, the remaining storeys being of brick with belt coursings and sills of stone. The brick for this work will be furnished by the Hamilton Pressed Brick Company, Limited. The roof will be of reinforced concrete and tile. The three entrances will all be of stone furnished by the Roman Stone Company. This building has been designed to be absolutely fireproof and noiseless, all partitions being of tile and floors of reinforced concrete and tile. Kahn bars are used throughout as concrete reinforcement. Two passenger elevators and one freight elevator of Otis-Fensom make will be installed.

The interior trim will consist of gumwood finished in oak with mahogany doors and hardwood floors, except in the bathrooms and halls, where the floors will be of tile. The bathroom walls will also be of tile. One feature worthy of note will be the vestibule at the main entrance which will be finished in marble. A portion of the basement will be set apart as a cafe and amusement rooms. A vapor vacuum system of heating will be installed, Spencer self-feed boilers furnished by the Waldon Heating Company, being used. The plans call for refrigerating plant, vacuum cleaning and telephone systems, gas for cooking and electric light.

The accompanying perspective and typical floor plan will give some idea of the design and proportions of the structure. The cost will be approximately $400,000.

The total value of building permits for September issued in forty nine of the most important cities and towns in the Dominion is approximately $21,000,000. This is considerably more than for the same period last year, the increase being no less than 57 per cent. The city of Calgary heads the list for September, the permits there reaching over $4,000,000, or an increase of 361 per cent. Nineteen of the above mentioned forty-nine cities have, in the nine months ending September, 1912, already passed the totals for the whole of 1911. Toronto takes the lead for the aggregate for the first nine months of 1912, the returns for that

A company has been formed in the United States to manufacture steel barrels made up of steel staves, locked together by an ingenious locking device, and with hoops and heads of steel. It is claimed, says the Ironmonger, that the barrel thus constructed is no heavier than wood, is more durable, safer, and more compact in shipment, and its cost is less than that of the wooden barrel. The cost of manufacturing a steel barrel is said to be about 35 cents, as against 45 to 50 cents for a wooden barrel. Each steel barrel will weigh about 21 lb., which is less than the average wooden barrel. The consumption of barrels annually in the United States approximates 300,000,000. Flour mills use about 90,000,000, the sugar industry 40,000,000, and the cement industry 75,000,000.

Placing Concrete During Fall and Winter Months*

At this season of the year the greatest care must be exercised in using reinforced concrete. Cold weather, with its attending atmospheric conditions, even though not freezing, has a bad effect on concrete. The following points are worthy of special consideration:

1. During cool weather, even though not freezing, the setting of cement is delayed. Sometimes two weeks or more after placing, it is possible to drive a nail into the concrete which indicates how serious is this delay in the setting. The only sure way of knowing when the cement is fully set and the concrete properly hardened, is to actually test it with a hammer for hardness. To do this, it is necessary to remove small portions of the form work in each section of the structure to be certain that there are no soft spots. Bear in mind, this delay and indefiniteness in the setting of cement is not due to freezing, but merely to medium cold weather and attending atmospheric conditions.

2. Be careful to avoid freezing of the concrete. While the days may not be particularly cold, the nights are often below freezing temperature. Therefore, protect all freshly laid concrete by covering it with some material that will prevent freezing. Be especially careful to protect this concrete during the nights. It is said, and may be true, that frozen concrete will re-set under certain conditions, but it is not advisable to depend upon such an uncertainty. The safest plan is to entirely avoid freezing. If absolutely necessary to place concrete during freezing weather, the materials such as sand, stone and water, should be heated and the placing of concrete so protected as to keep its temperature above freezing.

3. Workmen are apt to become careless during cold weather. They have a tendency to shirk their duty when it exposes them to the cold. Therefore, particular care should be used by the superintendent in charge, to see that the forms are properly braced, that the bottom of beam and column boxes are clean before pouring concrete, that the steel is accurately placed, concrete thoroughly mixed and the workmanship in general, the best possible. Special vigilance is required of the superintendent at this season of the year.

4. The most important point, and one whose importance cannot be over estimated, is caution in the removal of form work. Don't remove any forms until absolutely certain that the concrete is thoroughly hardened and that no portion is either soft or frozen. Even after you are certain that the concrete is hard, then remove the forms very carefully and without shock to the structure. Always leave in place a few intermediate posts so as not to place the entire dead weight too suddenly on the beams and columns.

We cannot emphasize too strongly the importance of special care at this season of the year to be certain that the concrete is thoroughly set and hardened before the removal of the form work and to guard against the treacherousness of the fall and winter weather in its effect on concrete work.

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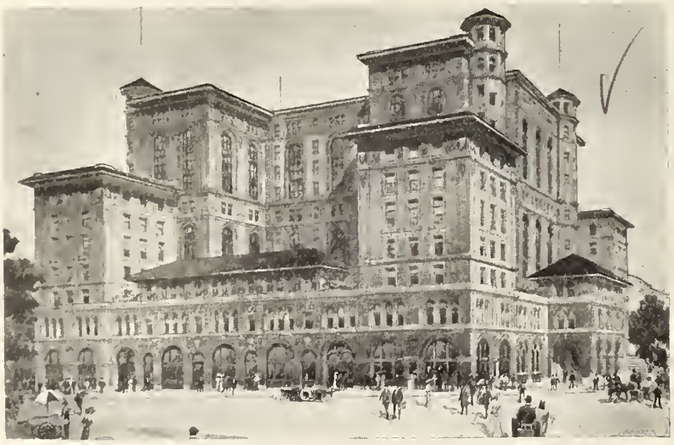
* Directions Issued by the Trussed Concrete Steel Company.

The New C. P. R. Hotel at Vancouver, B. C.

Palatial Fifteen-Storey Structure that will contain Five Hundred Rooms and Cost Upwards of Two Million Dollars

WHEN completed, the new C. P. R. hotel at Vancouver, B.C., designed by Mr. W. S. Painter and Mr. Francis S. Swales, will be one of the finest on the North American continent. The ultimate cost of the hotel building proper will be over $2,000,000, but only about half the structure is included in the present contract with Skene & Christie, of Vancouver. The hotel is to consist of 15 storeys in the central portion, with ten bedroom storeys in the wings. The cut shows the lower portion of the building as approved by Sir Thomas Shaughnessy, but the design will not be architecturally complete until another four storeys now being studied by the architects are added. The steel work in the central block has been designed to carry the four additional storeys referred to, which it is anticipated will be required in the near future. When the building is complete there will be more than 500 bedrooms; the structure now under construction will provide about 300 bedrooms.

At present work is being done on the central cross wing and two wings toward Howe street, the latter to be ten storeys high and to contain bedrooms. A smaller block estimated to cost about $500,000 has been approved by the President, and the appropriation is expected to be made as soon as the present contract is far enough advanced to enable the company to tear down the old structures along Granville street and extend the new building over the entire ground area.


Proposed C. P. R. Hotel, Vancouver, B. C.

The building will consist of a steel frame, with reinforced concrete floors on the Kahn two-way system. The exterior is to be of Clayburn buff brick with terra cotta and marble trimmings. The interior will be chiefly finished in fine wood panelling, walnut and oak. The main idea of the architects in designing the building is to get away from the showy type of hotel, to in fact construct a building which will convey more the impression of a beautiful residence—more of a house than a hotel.

On the ground floor there is to be located a foyer 40 x 100 feet, from which guests will be able to enter the dining room lobby and the palm court, the latter being oval in shape, covered with glass, and 60 x 80 feet. The present hotel is being partly utilized, and on the same floor the existing dining and ball rooms are to be converted into a large dining room extending the length of the Howe street wing. Six private dining rooms are to be included, also writing room, telephone and telegraph offices, retiring rooms, and an outdoor dining space on the porch on the ground floor.

The whole kitchen will be placed on the level between the dining rooms and the grill room. The grill rooms will be reached by a slope, there being no connecting steps. The kitchen will be situated slightly below the levels of the existing main dining room, which has two levels and a gallery. There will be convenient communication arranged by means of several dumb-wiaters and steps planned at a low pitch so that waiters will pass up and down a ramp rather than a staircase. Large well equipped serving rooms will be placed adjoining each room or space used for serving meals, so that the number of trips to be made to the kitchen by waiters will be greatly reduced, and fewer waiters than usual will be required to give a highly efficient service. The serving rooms will include a carving table and small still room in each. The very latest equipment in the way of ranges, grills and vegetable cookers is to be provided, and it will be so arranged as to facilitate personal supervision by the chef. The cooks' department will be entirely separated from the waiters' passages, the floor of which will be of rubber tiling in order to prevent breakages and reduce noise in the kitchen. All dishes are to be cleared in the serving rooms and sent direct to the dish washing room, without being carried downstairs. A special feature of the ventilation of the kitchen is a glass and iron hood, which will enclose the whole of the cooking departments; all odors will be drawn off by exhaust fans placed in the ceiling, and any gases or vitiated air will be drawn off at the floor level. There will be a change of air every six or eight minutes.

The grill-room, which will be in the wing towards Granville street, is to overlook a fine billiard room, arranged with a raised platform at which orders will be served. The bar is the length of the grill-room, and extends 100 feet along the Granville street front. It is fitted with a lift and has staircase communication with the wine stores, which are below the grill-room. The bar is planned to give the best service of any hotel on the continent, and is accessible from the grill-room, billiard-room, and from two outside entrances near the two corners of the Granville street front. An outside entrance also serves the barber shop and sample rooms. The latter will extend the entire length of the Georgia street front of the hotel. The whole of the steward's department will be on the basement level except the receiving and storage rooms, which are to be on the sub-basement level served by a wagon court. This court also provides for receiving and despatching baggage.

The plans for future extension on Granville street include a large room for conventions, concerts, and entertainments. This will be provided with two large serving rooms in easy communication with the kitchen, so that large dining parties or balls may be accommodated without any crowding or inconveniencing the regular guests. Rooms along the side towards the neighboring opera house are to be used as retiring rooms in connection with the convention and concert hall. A row of shops will be constructed along Granville street, entrances being made from the street and from the hotel. The large shop at the corner of Granville and Georgia streets will be occupied by the C. P. R. ticket offices.

On the first floor will be a gallery overlooking the foyer and concert hall; a business room for the holding of directors' meetings; a writing room; and maids, valets, and children's dining rooms. The remainder of the building will consist of bed and bath-rooms, practically all the bedrooms having a bath-room adjoining. Every bedroom will be of ample dimensions so as to take two single beds. All the bedrooms will be outside rooms, and none will receive light from small or interior courts. The bedrooms will be finished in Douglas fir painted white. It is expected that a roof-garden will be added. Electric lights will be placed at each bedside, with a telephone in each room within easy reach of the occupant. Lights will also be arranged with a view to serving the dressing tables. The furnishing will be of a particularly artistic character.

There will be several elevators of the plunger type, for both the central portion and the wings. The dumb waiter service will be especially good, and will be equal to anything on the European continent.

The power house, which has been completed as a separate contract, at a cost of about $300,000, is situated on a neighboring site in the rear of the hotel, and will contain the boilers, pumps, electric machinery to generate light, &c. Here is also placed the laundry.

The smoke stack for the power house is 225 feet high above the ground, and extends to a depth of about thirty feet below the surface. It is of reinforced concrete, lined with fire brick to a height of ninety feet. Reinforced concrete is used only above that point. In constructing it 150 five-eighths inch steel reinforcing rods were used, each being about thirty feet in length. Twenty-four one inch rods were also used in reinforcing the stack, together with large quantities of half-inch hooping. Some idea of the size of the stack will be gained from the following figures; thickness through base, which is octagonal in shape, 13 feet; inside measurement of stack from top to bottom, 7 feet; height above sidewalk, 225 feet; total height from base to top, 255 feet.

A fire test on a reinforced concrete tank was conducted recently by Howarth Erskine, Ltd., before a body of engineers and architects in Singapore, India. The tank was of cubical shape, 5 ft. edge measurement, with walls 3 in. thick plastered on No. 24 gauge Hy-Rib, extending horizontally. The corners were reinforced with 2¾ in. angles. The mortar used consisted of five parts of cement, twelve parts of sand and one part of lime paste, and Trus-Con waterproofing paste was used in the water. The tank was tested when 29 days old, and for two weeks previous it was kept filled with water, no leakage resulting. After emptying the tank, 160 gal. of kerosene, equivalent to about 12 in. depth were poured in and ignited. The fire burned for 2¾ hours and measurements taken at intervals showed a maximum deflection of ⅜ in. at the centre point of the side. The tank while still warm was filled with water to a level of 18 in. below the top. According to the official report of the test, water leaked out of some few cracks that had formed, but the walls maintained their strength and elasticity against the water pressure

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The Sayward Building, Victoria, B. C.

The Sayward Building, situated on the corner of Yew and Douglas streets, Victoria, B.C., is ranked as one of the best constructed office buildings at Victoria, B.C. It is of reinforced concrete and skeleton steel frame construction, measuring 80 x 120 feet, and standing six storeys in height, with full basement. The main entrance is decorated in marble. All corridors have marble wainscoting, and the floors are finished in the same material. The office flooring is combination terra cotta tile and concrete—known as long span slab construction. Fir is used as inside finish throughout. The Kahn system of reinforced concrete, furnished by the Trussed Steel Company of Canada, was used in the construction. Messrs. G. C. Mesher & Company, the architects, also had charge of the contract.

Sayward Building, Victoria
Architects, Messrs. G. C. Mesher & Company, Victoria

The construction of a floating dry dock at Toronto has been begun by the Polson Dry Dock and Shipbuilding Company, Limited. It will be the first steel floating dry dock built in Canada, and will be of the sectional "U" type. The plans have been approved by the Canadian Government, by which the work is being subsidized. The dock is to be 330 ft. long by 100 feet wide and 35 ft. 4 in. deep, and 72 ft. wide on deck, 88 ft. wide on top with 8 ft. 6 in. depth of hold. It will be built in two sections of equal heights, weighing approximately 2400 tons, with a lifting capacity of 4400 tons. The pumping equipment consists of twelve centrifugal pumps with a capacity of 42,000 gallons per minute, in batteries of three in each quarter of the deck, each battery driven by a 75 horsepower direct connected motor and all the pumps being controlled from a central station ashore.

The Contractor and the Public Official

Relationship Defined—Conditions that Exist and Conditions that should Exist—Entire Responsibility in Engineer Recommended*

By C. A. Crane†

A DISCUSSION of the relation between contractors and public officials might be divided under three heads: What they are thought to be, what they are and what they ought to be.

What they are thought to be finds its only parallel in the nursery belief in Santa Claus, which is no more hallowed than the time-honored tradition in every newspaper office in the country concerning the financial status of contractors. There is never an event chronicled in the press in which a contractor figures, that he is not mentioned as "so and so, the wealthy contractor." All of which prompts the unnecessary question, "Where did he get it?"—unnecessary because the general public harbors the delusion that the wealth was attained in public contracts in collusion with public officials.

There is perhaps no industry which is so intimately connected with the progress and welfare of a country as that of the contractor. His task is the physical development of the locality. The work is in the open and its progress is carefully watched by the community. Every passer-by is a self-appointed inspector; his criticisms are governed more by personal inconvenience than by any real knowledge of how or why the work is being conducted, and proportionate with the inconvenience, is the firmness of his conviction that the contractor and the public officials are leagued together in a "public be damned" policy. In any event it is the popular belief that the contractor is amassing a fortune and only gets his contract through "pull."

"Pull" Not Universal

In all candor we are bound to admit that there has been great justification for this belief. Doubtless we are all familiar with the practice, sometimes observed in the smaller towns, of receiving the bids in public, but opening them in executive session. To insinuate on the reasons for such a custom is inadequate—experienced contractors know. These irregularities are deplored by honest contractors—in fact they are deplored by every contractor except that particular one who gets the contract—and the very first time he finds the trick has worked in favor of another, he shouts the loudest of all.

Just as dishonest officials are in the minority so are honest contractors in the majority, and they are equally anxious with honest officials and the public generally that the contracting business shall be put on a legitimate basis, which will afford every opportunity for honest competition and minimize favoritism and graft.

A recent editorial in one of our large dailies, commenting on the expenditure of public funds for a large improvement contained this sentence: "In dealing with contractors eternal vigilance is essential." The implication there is that the contractor is the culprit—but dishonesty can't thrive single-handed.

Now we take it that one of the purposes of this Congress is to correct contract abuses and to establish legitimate practice. You must do that before you can succeed in building good roads or anything else, no matter how theoretically perfect a set of specifications you may devise. Since we must all confess that the relations between contractors and officials are not always above suspicion, the problem is to remove the opportunity for suspicion. Why not adopt the policy of the hotelkeeper who announced on his bill-of-fare that "to prevent fruit being taken from the table, there will be no fruit." Cut out all personal relations between contractors and political officials and let these relations be through the proxy of the engineering official. Choose a big man in his profession and pay him a big salary—put him under a heavy bond to guarantee the accuracy of his work and the validity of his certificates of payment. Why should a disbursing officer be held responsible for an engineer's voucher, unless he has equal facilities for checking the work that the engineer had in computing the amount? Centralize the power and the responsibility.

Contractors prefer contracts with railroads and private corporations to public work, because their dealings are almost entirely confined to the engineer or the architect, and they are not encumbered with the delays and red tape that characterizes our contracts for public work. To one lawsuit over a railroad contract, there are a hundred over public contracts—and is this not because the railroads employ a higher grade of men to superintend their construction? Men who are competent to and do settle disputes fairly, unhampered by the statutes and ordinances under which public work is conducted. It is true there are many of our large public improvements to-day going forward under the guidance of the best engineering talent in the country. To these exceptions our criticism does not apply—but to the general custom which places inefficient men in charge of engineering construction on public work.

A serious mistake made by public officials is to underestimate the necessity for paying high salaries to engineers. Well paid positions will attract a higher grade of men and remove temptations which beset the path of the under-paid engineer in the field. The men in the field are relied upon by both the chief engineer and the contractor, and the greatest risk the contractor assumes lies in the ability of this sub-engineer to whom is delegated the power of interpreting the contract.

Success in Contracting

The success of a contract lies in its execution—not in its wealth of legal protection for the contractee. Take any contract issued to-day for public work to a lawyer and ask his opinion of it. He will tell you a man is a fool to sign such a document. It is so drawn as to provide every safeguard for the contractee, and to place entire responsibility for everything that may happen, including the acts of Providence, up to the contractor. He literally signs away all his rights in the present and hopes for the future. This is not the work of the engineer, but of the legal officials.

But the contractor wants the work, and in the contracting business three qualities are essential—faith, hope and nerve, and the greatest of these is nerve: nerve to disregard counsel's warning, faith in his own ability to do the work, and hope that the engineer in direct charge of his work will give him a square deal.

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*A paper presented to the American Road Congress, Atlantic City, Oct. 1912.

†Secretary, The General Contractors' Association.

It is impossible to over emphasize the importance of the relation of this engineer who is in direct charge. He is called upon to give immediate decisions on important questions, in the absence of his superiors. He is clothed with all the powers conferred in the contract and these are liable to be over, rather than under-exercised by the too zealous and inexperienced engineer. Care in the selection of his deputies, and personal attention to their training by a chief engineer are tremendous factors in securing harmonious relations with the contractors. Constant bickering prevents good work, and the chief engineers who have been most successful are those who have infused in their subordinates the realization that tact and diplomacy win more battles than obstinacy.

The Engineer as Arbitrator

Most contracts designate the chief engineer as the arbiter of all disputes over the amount and fitness of the work, his decision to be final and binding on the contractor, but this power is usually qualified elsewhere in the contract by providing that the engineer's decision shall be subject to the final determination of the Commissioner or the Board, as the case may be.

This qualifying clause might easily become a mischief breeder. Any loopholes which permit the slightest chance for questionable dealings between contractors and officials should be guarded against. The days of the contractor with a "pull" are passing. Even the simplest class of public improvements is now supervised by an engineer. The less that contractors and Commissioners come in contact the better. The Commissioners' attention should be devoted to the administrative details—with matters pertaining to construction left to the engineers. The engineering profession fortunately ranks high in integrity, and the unfortunate cases in which scandal has entered into the contracts are but rarely charged to any dishonest acts by or collusion with, the engineer. The objection raised to allowing the engineer to be the final judge as to the quality and fitness of the work, is that since he is paid by one of the parties to the contract he is naturally biased toward his employer, but it is generally conceded that in the majority of cases the engineer who has designed and supervised the work is best fitted to make the decisions. There are many questions, however, which arise that are concerned solely with quantity or quality—questions of proper interpretation, and we believe disputes of such nature should be submitted to arbitrators. No honest and capable engineer fears or can object to any scrutiny of his work by an equally competent engineer, and, therefore, an appeal from his decision should be allowed before a referee competent to pass upon the technical matters involved. This is the only form of appeal which should be permitted in the contract. An appeal to the Board or to a Commissioner can be made only for the purpose of securing through friendship or worse what the engineer will not allow, and if the Board of Commissioners is honest and has confidence in its engineer, it naturally will deny the request. The position of the engineer who would be asked by his board to alter his determination would be exceedingly unpleasant. He would be in the dilemma of refusing to obey orders or of certifying to something against his judgment. Engineers are human and jobs are not always plenty, and we realize that engineers have their troubles as well as contractors. To avoid such dilemmas, the engineering profession should demand a form of contract providing that their rulings could only be reversed by arbitration before a member or board of their profession.

We realize that there are many questions of law involved in contracts that are often the subject of division by members of the bench, but we submit that if the preparation of the entire contract, as well as the specifications were left to the engineer, he would at least be able to prepare as comprehensive a document as the lawyers, and there could hardly be any question involved which another engineer could not understand for the purpose of making a fair decision. A suit at law is not the most satisfactory way to settle a dispute which really hinges on the question—was the work done as it was intended and represented in the contract? Lawyers naturally look for legal points of attack and defense, for many a case has been decided on a purely legal technicality far beside the equity of the suit.

This arbitration question has been tried out in many forms and unfortunately no method has yet been adopted that seems satisfactory.

It would seem that the single arbitration is the solution of the difficulty, and this scheme is concurred in by the National Federation of Building Trades Employers of Great Britain which recently prevailed upon the Council of the Institution of Municipal and County Engineers to adopt a modification of the clause regarding the engineer as the sole arbiter of disputes. The Council recommended the adoption of a clause submitting the dispute to a single arbitrator to be appointed by the President of the Institution, the award of such arbitrator to be final and binding upon the parties. The nature of the questions to be submitted for arbitration is to be confined to the interpretation of the contract or any matter arising thereunder—but not on decisions as to the quantity and fitness of the work—and also as to the withholding by the engineer of any certificates to which the contractor might claim to be entitled. The arbitration is not to apply to any contract amounting to less than $5000 and no question involving a sum less than $250 shall be submitted. We believe that some such measure might well be considered by our public officials. It would minimze litigation and thus remove one of the greatest sources of friction between contractors and public officials.

The attempt to regulate these relations and to prescribe by statute for nearly every contingency that may arise in a contract is in our judgment a mistake. Laws are no stronger than the men who enforce them, and if it be the fact that laws are necessary to curb our public officials, something is radically wrong with our system of government. You can't legislate honesty into a man—you may render him more cautious, but if he be dishonest he will circumvent any law made. What we need is better men, not more laws, and public office should offer the best men suitable compensation for their services to the public.

This subject is one that cannot adequately be discussed in a short space of time. So much depends on the relations of the contractor and the public official—the success of the smallest undertaking. Reduce them to a minimum—cut out all relations with the political official—divorce contracts from politics—and the mellennium will be at hand

Evolution of Road Systems in Canada

Methods of Administration in the Several Provinces—Progressive Legislation and Large Expenditures—An Era of Highway Building*

By W. A. McLean, Provincial Engineer of Highways for Ontario

EFFICIENT system and organization form the key to highway improvement. If the laws, and plan of administration are properly arranged, all details will be taken care of. If the system is well designed, ratepayers and citizens will have at their service a powerful machine, perfect in all its parts, that will produce finished highways, durably built, adapted to the service they are to perform, well maintained, and at a minimum cost.

System implies an effective means of procuring necessary funds, a fair and just method of distributing the cost, a general management based on good business principles, the application of engineering skill to design, and construction carried on with the best utilization of power and labor.

The creation of a thoroughly efficient system of highway construction and maintenance, is a task which, in Canada and the Canadian provinces, is being actively considered and dealt with. While some satisfactory progress has been made, measures to the present time have been those of the formative stage. Evolution rather than revolution has been the history of legislation in countries of the north, and highway systems and measures of Canada are following that general rule.

The Canadian form of government is similar to that of the United States in some respects. Canada is a union of provinces, with a federal administration at Ottawa, just as the United States is a federation of states with seat of government at Washington. Each of the nine provinces has its own legislature, as have each of the states; and the provinces are again divided into local municipalities—the rural being townships, and counties; and the urban are villages, towns and cities—but as in the States, local government varies in the different provinces.

The Canadian constitution, "The British North America Act," defines the powers and jurisdiction of the Provincial, and those of the Federal or Dominion Government. Under that Act, legislation respecting public roads and municipal organization is within the authority of the provinces, although the Dominion Government has power to subsidize road construction. The tendency in each province (with certain exceptions) until recently has been to regard the opening and grading of roads in new territory as a provincial function, while the real improvement and construction of these roads is a municipal function, as settlement becomes established and municipal organization is created.

Canada has a geographical backbone, a rocky mineral region about the centre of the continent, extending northerly from Lake Superior to Hudson's Bay. West of Lake Superior the four provinces of Manitoba, Saskatchewan, Alberta, and British Columbia are comparatively new, having been developed since the construction of the first Canadian transcontinental railway, the Canadian Pacific Railway, in 1886. East of the Lake Superior region are the old provinces of Ontario, Quebec, New Brunswick, Nova Scotia, and Prince Edward Island.

British Columbia

British Columbia, on the Pacific coast, is traversed by the Rocky Mountains, and municipal organization is, therefore, interrupted. In consequence, the Provincial Government has always contributed largely to road-building. At the present time a special fund is being spent on the construction of trunk roads at the rate of $5,000,000 annually, under the direction of the Department of Public Works. Stone for macadam roads is plentiful, but the grading of mountain highways is expensive. The trunk roads now being built have an important scenic value, and upon completion will attract many tourists. In the past ten years approximately $15,000,000 has been spent by the province on roads and bridges, but the expenditure of an equal amount in the three years 1912-14 is now outlined.

Saskatchewan and Alberta

Saskatchewan and Alberta, occupying the prairie country north of Montana and North Dakota, were granted provincial organization in 1905, and are in a pioneer stage of development. Earth roads, with bridges, are the present need, and very little has been done toward good stone or gravel roads. Each of these provinces has a provincial highway department, however, and is drawing largely on its resources for road expenditure. The provincial governments in each case are grading and bridging the main roads. As fast as settlement permits, three or four townships are organized into local improvement districts with councils to expend money raised by local taxation. In the case of Saskatchewan, an annual provincial appropriation (in 1910, the sum of $60,000) was set aside to be drawn upon by the municipalities under a plan of provincial aid. The chief provincial expenditure in these provinces is applied, however, to trunk highways, by the Provincial Highway Departments, through their own foremen. Steel and wooden bridges are also erected by permanent "bridge gangs." The provincial departments also carry on educational work. In Saskatchewan a special appropriation of $5,000,000 for trunk roads, was made at the last session of the Legislature, of which $1,500,000 will be spent this year; in addition to the usual appropriation of $400,000 from current revenue. In Alberta a special grant of $1,000,000 was made this year for a central north and south trunk road in addition to the usual sum of $250,000 from current revenue.

Manitoba

Manitoba has for several years had a Provincial Highway Commissioner whose duties were largely educational. At the last session of the Legislature (January, 1912) two important acts were passed. One of these the Act Respecting Provincial Highways, set aside $200,000 annually for provincial aid to main roads. Townships are permitted to lay out a special system of main highways, and this plan with specifications is to be submitted to the Provincial Highway Department. If approved by the provincial authorities, the township may issue thirty-year debentures and proceed with the work, receiving a grant of two-thirds of the expenditure from the province. In this way it is expected that a serviceable system of provincial roads will be constructed.

The other Act, known as "The Good Roads Act," is one which relates to minor roads, and does not provide provincial aid; but requires any township undertaking the improvement of these roads to submit the plans to the provincial authorities; and upon approval, the township may issue fifty-year debentures to meet the cost—which debentures may be guaranteed or purchased by the Provincial Government. The work done under this Act is also subject to the inspection and approval of the Provincial Highways Commissioner.

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*Paper presented at the American Road Congress, Atlantic City, Oct. 2nd, 1912.

Ontario

Ontario is, physically, in two parts—old Ontario, settled for over a century, and with complete municipal organizations; and new or Northern Ontario, now being opened for settlement. In New Ontario, the Provincial Government is this year spending about $850,000 on colonization roads—opening and grading the road allowance—and about $250,000 for bridges.

In Old Ontario, the local municipalities are spending yearly about 1,100,000 days of statute labor, and $1,400,000 in cash. A large proportion of the latter goes into durable concrete culverts and concrete and steel bridges.

The Highway Improvement Act of Ontario is one of the most successful of Canadian road measures. County councils (composed of the reeves of the local municipalities composing the county) are empowered to pass a by-law assuming for construction and maintenance a system of main highways.

To this work the Provincial Government contributes one-third of the cost of construction as the work progresses. The Provincial Highway Department fixes certain regulations as to construction and management, inspects from time to time, and co-operates with the municipalities to obtain good results, but the active control is vested in the county councils through their own county engineer.

This Act has been in operation for eleven years and the annual outlay under it is steadily increasing. In 1911 the total expenditure was $711,000, of which the province contributed one-third.

This Act is largely educational in its aim, but at the same time is producing mech excellent work at a low cost. The educational effect has several features:—

(1) It brings about an increasingly high standard of road construction, which teaches the public what good roads are, and how they should be built.

(2) It instructs county councillors in road construction and impresses upon them the principles of good organization.

(3) The roads and organization become models which are observed and imitated by the township councils, so that all roads are affected.

(4) It enables the Provincial Highway Department to prescribe good principles, and the results of investigation, in an effective way.

The Ontario Highway Department is also constructing, at various points, model roads at the sole cost of the province, or with a partial contribution from the municipality in which the road is built.

Quebec

The Province of Quebec has been extremely active in the matter of road construction, and has adopted several measures of a progressive character.

(1) The Province loans roadmaking machinery to municipalities making request, and has ten complete outfits for this purpose.

(2) Grants are made to local municipalities which dispense with the labor tax, and build an extent of durable gravel or stone road. Nearly 600 out of a total of 1,000 townships are this year taking advantage of the measure.

(3) The sum of $10,000,000 borrowed under forty-one year bonds, has been set aside for main highways. Municipalities may, for their construction, draw upon that sum, and are only required to meet one-half the interest (two per cent.) on the moneys so used for the term of the bond issue, the Province meeting the sinking fund and remainder of the interest.

(4) Three provincial highways, aggregating 350 miles in length, are now under construction. To this work the local municipalities pay $1,000 per mile, and the Provincial Government contributes the remainder.

New Brunswick

New Brunswick has not as yet developed a broad policy leading to permanent road construction, but the Provincial Engineer, by means of a contribution to county and parish construction, is enabled to bring technical instruction to bear on the work. The Province appropriated $100,000 annually for this purpose.

Nova Scotia

Nova Scotia is very actively canvassing the road question. The Province is sub-divided by county organization only, and the counties levy a statute labor tax amounting to about $250,000 annually. But the Province spends about $200,000 annually on road construction through an active and well-organized Provincial Highway Department. The Province constructs all bridges costing over $500.

Prince Edward Island

Prince Edward Island, the smallest, but one of the most fertile of the provinces, has an isolated position in the Gulf of St. Lawrence. Except in the case of two cities, there is no municipal organization, and the Provincial Government exercises direct control of all the roads. The province is divided into thirty-eight districts, each having about one hundred miles of road, and a road overseer is in charge of the work in each. The province spends about $32,000 annually in maintaining earth roads and very little macadamizing has yet been done.

The Federal Government

The Dominion Government at the last session introduced a Bill to provide for grants to Provinces, to aid in highway improvement; to be distributed according to population, and also to provide for direct expenditure on construction by the Dominion. The Bill passed the House of Commons, but the Senate, while approving of subsidies, objected to the Dominion Government making direct expenditures. The amendments of the Senate were not acceptable to the Government, the Bill was not re-introduced into the House of Commons, and the measure thus failed to become law.

Summary

Canadian road systems have been, to the present, without enormous government appropriations or other spectacular features, and construction as a rule has been of a comparatively inexpensive type.

Summarizing the situation briefly, Canadian provinces have about 250,000 miles of public highways. Each of the provincial governments contribute directly to road improvement; generally in the form of provincial grants, where municipal organization permits. Such grants rightly directed help the people to help themselves, combine all energy into one effort, and have a highly educative value. Each of the provinces has a highway department for building roads with which the educational object is more or less associated. The Canadian Highway Association is now carrying on an extensive propoganda to construct a road 4,000 miles in length from Halifax to Victoria, while the Ontario Good Roads Association, the Manitoba Good Roads Associations, and other organizations are doing much to form public opinion. As a result of the interest created, provincial appropriations are now being made in millions where they were formerly made in thousands. This year the total provincial expenditure, apart from municipal levies, will amount to $10,000,000. Canada has developed splendid railway and waterway systems, but it is evident that an era of common highway building is being entered upon, that will connect the trunk lines of transportation with the homes and daily life of the people

Annual Convention of the American Railway Bridge Building Association

There was a representative Canadian attendance at the 22nd annual convention of the American Railway Bridge and Building Association, held at Buffalo, Md., October 16-17 One of the features of the meeting was an exhibit of materials and equipment employed in bridge building work held by the manufacturers in rooms adjoining the convention hall.

The annual address was delivered by the retiring president, Mr. F. E. Schall, of the Lehigh Valley Railroad.

The committee on derricks and other appliances for handling material in supply yards, presented data on the methods in use by many roads and on the general application of mechanical handling in improving economy in this detail of maintenance work.

Concrete tank construction was treated in a report prepared under the direction of Mr. F. E. Weise, chief clerk, bridge and building department, Chicago, Milwaukee & St. Paul Railway, chairman of committee. Reinforced concrete culvert pipe was the subject of a report prepared by a committee with Mr. L. D. Hadwen, engineer of masonry construction, Chicago, Milwaukee & St. Paul Railway, as chairman. This report presented a digest of the experience of the principal users of such pipe, covering the suitability, types, joints, reinforcing, seasoning and economy. Several appendices contained detailed accounts of the practice of several roads, methods of manufacture, cost, and also a set of specifications.

The construction and maintenance of long pipe lines for locomotive water supply was reviewed in a report by a committee of which the chairman was Mr. B. J. Mustain, of San Diego, Cal. The general principles of building efficient long pipe lines were set forth and this discussion was supplemented by complete descriptions of the Bonito 135-mile high-pressure wood-stave pipe line, which has been in service for 25 years, and of the water stations on the Western Australia government railways. Discussion of this report centered on the life of wood-stave pipe lines and on the protection of iron pipe from corrosion.

A comprehensive report on the development of turntables to meet conditions imposed by modern locomotives was rendered by the committee on this subject, of which Mr. C. E. Smith, bridge engineer, Missouri Pacific Railway, was chairman. The practice of a large number of roads was reviewed in detail and recommendations were deduced as to the principal points of design. This information was summarized at the end of the report in tabular form. Some of the most extended discussion of the convention was brought out by this report, particular attention being directed to bearings and the loadings employed in design.

The committee on the painting of iron and steel for bridges and buildings, of which Mr. C. Ettinger, painter foreman of the Illinois Central Railroad, was chairman, presented a summary of practical considerations entering into work of this character.

A committee which had investigated the relative merits of brick and concrete in railway buildings and platforms, included in its report data on the extent of application of these materials, character of service obtained and some costs.

Subjects for further study by committees during the coming year were assigned as follows: Water supply; track scales (continued); equipment and tools for bridge gangs; heating and ventilating roundhouses and shops; sewers and drains; motor cars for bridge and building gangs; temporary structures for supporting tracks during construction of permanent work; concrete posts, poles and signs; snow fences; preservation of timber and framing on the work; cattle guards.

Officers for the coming years were elected as follows: President, Mr. A. E. Killam, general inspector of bridges and buildings, Intercolonial Railway of Canada; vice-presidents, Messrs. J. N. Penwell, of the Lake Erie & Western, L. D. Hadwen, Chicago, Milwaukee & St. Paul; T. J. Fullem, Illinois Central; G. Aldrich, New York, New Haven & Hartford; secretary, Mr. C. A. Lichty, Chicago & North Western; treasurer, Mr. J. P. Canty, Boston & Maine.

Activity at Edmonton

The Edmonton Cold Storage Company is having plans prepared for a four-storey warehouse, costing $115,000, at Fourth street and Peace avenue. The foundation and walls will be of sufficient strength to carry three additional floors, to be built as soon as the business warrents it. There will be accommodations for one hundred cars. The plant will be modern in every respect. Construction will begin early in 1913.

Sir James Jones, president of the Massey-Harris company, was in Edmonton recently looking for a site with trackage facilities for a large warehouse to be erected next year. Sir James said that a large plot of ground was required, as the buildings would be extensive though not necessarily of great height. If this plan is not carried out the company will build an addition to its present warehouse in Howard street, Edmonton.

Application has been made to the city council of Edmonton for three grants, totalling $600,000, for these hospitals: South Side, $300,000; Royal Alexandra, $250,000, and Misericordia, $50,000. The first-named is for a new structure on the university grounds, while the board of the Royal Alexandra require $250,000 to complete that institution. The city also is figuring upon an isolation hospital to cost $100,000.

Extensions of the municipally owned street railway system in Edmonton to accommodate interurban traffic will necessitate the erection of a central or divisional station early in 1913. The city is building a line to St. Albert, six miles, and has a charter to tap practically every town in Central Alberta. The Edmonton Inter-Urban Railway company announces through Mr. M. Kimpe, general manager, that its line to St. Albert will be in operation next April.

The Western Supply and Equipment Company, which has a branch at Calgary, has closed a deal with owners in Edmonton for a warehouse site in Fourth street, on the north side of the Canadian Northern Failway Company's tracks. Teams and men are at work filling the low places and excavation is in progress for a large structure, to be completed next year. The company will serve points in Central Alberta from Edmonton.

The Presto Heater Company of Alberta, recently organized, is arranging to establish a plant in Edmonton to manufacture a new furnace, invented by H. Guimont of Montreal. Mr. W. A. Aubin, director of the company, says the plant will be in operation in December, also that a larger building will be erected next year. Mr. J. E. Bertrand, a capitalist of Montreal, is interested in the enterprise.

Frederick Schilling, secretary-treasurer of the Spokane Ornamental Iron & Wire Works, is planning to establish a branch factory, employing fifty skilled workmen, in Edmonton. Two buildings will be erected next year, one of them being devoted to the manufacture of concrete filled poles and posts, designed by A. B. Stewart of Edmonton.

Premier A. L. Sifton of Alberta, announces that the provincial government will erect a telephone exchange, costing $150,000 at McDougall avenue and May street, Edmonton, where it owns a site 50 x 100 feet. The building, upon which work will begin soon, is for the long distance system.

Superintendent Woodroofe of the Edmonton Radial Railway, owned by the municipality, has recommended that a contract for 35 new cars be awarded to the Preston Car and Coach Company of Ontario. The company offers to supply car bodies and standard motor trucks at $5,365 each, f.o.b. Edmonton. The equipment and brakes will bring the cost of each car to $8,350.45.

Canadian Railroad Development

Among the new lines of the Grand Trunk Pacific included in plans recently approved by the Board of Railway Commissioners are the following:—Revised location plans from Mile 12.71 to 18.48 and location plans from the latter point to Mile 21.86 of the plan from Harte to Brandon. The line from Regina to the International Boundary near Portal, Sask., a distance of 134 miles, has been completed so far as the grading and building of structures are concerned. It is reported that 33 miles of steel had been laid up to the end of August and that the whole mileage would be laid and ballasted by December. At the boundary the line will connect with a line of 22 miles being laid northerly from Niobe, N.D., by the Great Northern Railway. The Board has also approved of location plans for the branch from Regina to Moose Jaw between Mile 40.01 and 47.74. The mayor of Moose Jaw has been informed by Mr. Morley Donaldson, vice-president and general manager of the company, that the right-of-way was being purchased through that town and that when this had been arranged construction would be continued. The opening for traffic of a further section of the Young-Prince Albert branch has likewise been authorized between Mile 45.5 and 67. This extension carries the branch to Wakaw, Sask., and the remaining 57 miles are under construction.

Track-laying is being steadily rushed forward from both ends of the Grand Trunk Pacific Railway in British Columbia. A gap of less than four hundred miles now separates the gangs, and the indications are that the line will be completed in 1914. Grading and other operations are now in progress throughout the length of the gap.

The Canadian Pacific Railway is turning its attention to the land bordering its lines in New Brunswick. Mr. L. O. Armstrong, manager of the Industrial and Colonization branch of the eastern lines, recently stated that farm and forest experts would visit the land and report on its possibilities.

Mr. Ross Thompson, chief engineer of the St John and Quebec Railway Company, recently returned from Ottawa where he had been taking up route matters with the Department of Railways and Canals. Mr. Thompson said that the company's location survey for the Valley Railway below Fredericton had been approved.

A Prince Rupert despatch received at Grand Trunk Pacific headquarters in Montreal states that steel on the main line east from the Pacific terminus is now five miles beyond New Hazelton and will very shortly reach Mud Creek.

With the laying last week of the final mile of steel on the Alberta coal branch of the Grand Trunk Pacific between Bickerdike and Mile 57 the last complete section of that railway built under the guarantee of the Provincial Government is ready for operation. The line was guaranteed at $20,000 a mile and it was stipulated that it should be completed by December 31st of the current year. The new line opens up one of the richest coal fields in the Canadian Northwest. To day it is available for the export of coal from the Pacific mines and four other companies it is understood will take immediate advantage of the new facilities thus afforded.

After a summer spent in the sub-division of portions of the northern section of Jasper Park between Pocohontas and Fort George on the Grand Trunk Pacific main line, Mr. G. A. Grassie, Dominion Land Surveyor, has returned to Edmonton in search of axemen for work on the survey. South of the G. T. P. this work has been completed and Mr. Grassie hopes that it will also be finished on the northern side during the coming winter. The survey consists of the location of section lines, sometimes through exceedingly rough country, but it is carried out only in the vicinity of the railroad track.

Personal Mention

Mr. W. R. Worthington, who on November 1st officially takes over the position of chief sewer engineer of the city of Toronto, is a native of the Queen city. In 1905 Mr. Worthington graduated from Toronto University as a civil engineer and entered the service of that city as assistant sewer engineer. Prior to that date, Mr. Worthington had studied at the Harbord Collegiate Institute in Toronto. Since Mr. Worthington has been identified with the sewer department, he has designed some of the largest sewers which have been laid down by the city of Toronto. Although Mr. Worthington's appointment dates from the first of November, he has been filling the position of acting chief sewer engineer for some time past.

Mr. Wm. R. Worthington, Engineer in Charge of Sewers for the City of Toronto

Mr. C. H. Rust, City Engineer of Victoria, B.C., has been appointed Water Commissioner of that city, in succession to Mr. J. L. Raymur. Mr. Rust's appointment dates from November 1st.

Mr. H. G. Puffer, excavation superintendent of the Courtney Bay Construction Company, St. John, N.B., has resigned his position and will take charge of the excavation work for the Panama Exposition of 1915.

At the recent annual convention of the American Railway Bridge and Building Association reported elsewhere in this issue, Mr. A. E. Killam, general inspector of bridges and buildings for the Intercolonial Railway, was elected President.

Mainly Constructional

The News in Brief—From the Atlantic to the Pacific.

A seven-storey hotel is to be erected on Richards St., Vancouver, at a cost of approximately $150,000.

A new chief of the accounting and purchasing branches of the Works Department, Toronto, is to be appointed at a salary of $2,500 per annum.

It is reported that Sir Max Aitken has offered to build a street railway in Medicine Hat on a similar form of charter as that on which the Winnipeg street railway is operated.

The city council of Toronto has decided to ask the Provincial Government's permission to establish and operate electric railways throughout the province as an adjunct to the Hydro-electric system.

Owing to the breakdown of one of the large pumps, Montreal has been suffering from a scarcity of water, and the city has engaged Mr. R. Colt, of New York, to investigate the water system generally.

Major G. W. Stephens, chairman of the Montreal Harbor Board, has resigned. The two other Commissioners, Mr. C. C. Ballantyne and Mr. L. E. Geoffrion, announced their resignation some weeks ago.

The Point Grey, B.C., council has recently passed a new water by-law. It is claimed that when the system is in operation the ratepayers will have cheaper water than in any part of greater Vancouver.

The new school building now in course of construction on Oxford street, Transcona, will cost when completed, about $93,000. It will be two storeys and basement. Red Menominee brick and cement are being used.

Several of the steel supporting columns are in place and work has been started on the concrete foundation for the new $200,000 theatre and office building which is being built on the site of the old Vancouver Opera House, Vancouver.

The fifteen new wells recommended in the report of Prof. Slichter to the city of Winnipeg, are expected to cost approximately $1,200,000. It is estimated that these wells should yield 6,000,000 gallons of water per twenty-four hours.

The Star Expansion Company, 147-49 Cedar street, New York, has just issued a pocket size booklet containing illustrations, descriptions and list of prices of the various toggles on the market. Copy of this booklet will be sent upon request.

In consequence of a difference of opinion between the Montreal Board of Control and the aldermen respecting the use of bithulithic pavement, this portion of the paving program will go over until next year, it being now too late to commence work.

A gas and coke plant estimated to cost $4,000,000 is the latest industrial project at Hamilton, Ont. It is promoted by a syndicate (represented by Mr. J. G. Gould, Canada Life Bldg.) which is reported to have purchased a property of 140 acres.

It is proposed to begin the work of locating a route for the proposed boat canal between Portage la Prairie and Lake Manitoba. Some of the deep creeks extending into the prairie from the lake towards this place will be utilized in connection with the scheme.

The York Township Council has decided in favor of double-decked bridges over the Belt Line and west Don entrances into Toronto, and has instructed the township solicitor, Mr. J. R. L. Starr, to negotiate at once with the Canadian Pacific and Canadian Northern railways in regard to this matter. It is thought that the underdecks on these bridges can be devoted to vehicular traffic.

It is estimated that if the contracts which had been given to private paving companies this year by the city of Calgary had been undertaken by the municipal paving plant, the ratepayers would have saved $150,000. It is suggested that the paving plant be increased.

A tile drain pipe, which was placed eight feet below the surface twenty-six years ago, has just been removed at River street, Toronto. The pipe when taken up was without a flaw. This argument has been adduced against substituting cast iron pipes for tiles.

Plans have been prepared for a large apartment house at the corner of Broadview and Langley avenue, Toronto. The property has a frontage of 119 feet on Broadview avenue and 182 feet on Langley avenue. Work will be started shortly if a permit can be obtained.

Fifty thousand dollars is the estimated cost of a three-storey hotel building with sixty rooms to be erected at Athabasca, Alta. The house will be heated by steam. John McGuire & Sons, of Milden, Sask., are the owners. The building is to be completed in May, 1913.

A new company has been formed in Port Arthur under the name of the "Port Arthur Housing Corporation, Limited," with a capital stock of $250,000 divided into $100 shares. This company has been promoted for the purpose of overcoming the lack of suitable housing accommodation.

An addition consisting of two storeys and a basement, measuring 100 feet by 95 feet, has just been added to the Cecil Rhodes school at the corner of Fourteenth avenue and Alder street, Vancouver, at a cost of $70,000. This addition is of reinforced concrete faced with red pressed brick.

It is proposed to make Crawford street, Toronto, a through thoroughfare from King street to north of Bloor street. To accomplish this it would be necessary to fill in a large gully and demolish certain houses, but the work when completed would allow the city to remove the Shaw street bridge.

The new Harbor Commissioners of Quebec, of whom Mr. W. Price is chairman, during the winter propose to consult engineers with a view to having plans for the development of the harbor drawn up. The commissioners hope to have the plans sufficiently advanced to be able to announce the most necessary works by next spring.

The C. O. Bartlett & Snow Company of Canada, Ltd., has been granted a Dominion charter, and will handle the Canadian business of the C. O. Bartlett & Snow Company, Cleveland, Ohio, but will be under entirely separate management. Mr. Herbert S. Hersey has been appointed general manager with offices at 282 St. Catherine street, Montreal.

Brandon's large building, the Winter Fair Arena, is making splendid progress. Fifty men and twelve teams are constantly employed and will continue as long as the weather is at all favorable. The work of constructing the new C. N. R. spur to the Fair Frounds is to be begun at once. The steel work of the Grand Stand will be begun next week.

Enquiry into the state of the labor in the West shows that the demand is still far greater than the supply. The attractive wages being paid for harvesting of course accounts to a large extent for this, but there is still a steady demand for skilled labor in many trades. One Western city has decided to send a representative soon to the old country to procure two hundred skilled workmen, carpenters, masons, etc. Construction work in some places has been badly hampered for want of men, and some of the more remote cities and towns of the west are considering the advisability of securing men in large numbers in the old land, and by conveying them direct to where they are required, taking precaution to prevent their being hired for other centres en route.

Messrs. Heap and Partners (Canada, Limited) Montreal, have secured a contract from the Ottawa Board of Control for three Rees Roturbo motor driven pumps with a total capacity of 45,000,000 gallons a day. The firm also have in hand for the city of Ottawa two Rees Roturbo motor driven pumps which are now in course of shipment from Wolverhampton.

Representatives of the Canadian Manufacturers' Association, the Board of Trade, Le Chambre de Commerce, l'Association Immobiliere, the Citizens' Association, and other public corporations of Montreal, at a joint meeting, have voted in favor of a smaller council with more clearly defined powers. A sub-committee has been appointed to secure these reforms.

The tender of Mr. C. A. P. Turner, of Minneapolis, Minn., for the high level bridge over the Bow River at Calgary has been recommended for acceptance, the figure being $769,000. The tender is considerably below the original estimate of the cost of the work by the city engineer, but this is due largely to the fact that the department included in the estimates the cost of land expropriation.

The good roads movement is making great progress throughout the province of Ontario and much enthusiasm is being shown by the municipal bodies interested. Mr. W. A. McLean, chief highway engineer for the Ontario Government, recently stated that about three hundred miles of new roads had already been completed this season. It is expected that a further one hundred miles will be finished before winter sets in.

A Child Welfare Exhibition, in the Drill Hall, Montreal, has been so successful that it is to be repeated in Toronto and Winnipeg. The hall has been filled day and night, and thousands have been unable to obtain admission. One of the features is a building section, showing types of sanitary and unsanitary houses, and models of back-yards where disease is bred. Plans of desirable houses, well arranged schools, boulevards, and model cities are also exhibited.

Tenders are being called for by the Hudson's Bay Company for the erection of a store in Vancouver which will cost in the neighborhood of $2,000,000. It will be a fireproof structure and will contain many novel features. The first section of the building will be erected on the property owned by the company at the corner of Georgia and Seymour streets. This portion of the store will require about nine months to construct, after which a start will be made on the site of the present structure.

A big real estate deal on King street, Toronto, has taken place in which the Colonial Investment and Loan Building at 47 to 51 King street west has been purchased by the Canadian Realty Company, of Montreal. The Realty Company are acting as agents for a large eastern corporation in the deal, who, it is understood, are to erect a large new office building. The price paid for the property was $[illegible]50,000, which is equivalent to $6,000 a foot. It is expected that the present building will be torn down in the spring.

Mr. Justice Guerin, sitting in Montreal, has declined to grant an interlocutory injunction debarring the city of Westmount from enforcing a by-law prohibiting the use by contractors and others of team wagons and trailers. The petition was presented by Mr. John Quinlan, and was on the ground that the by-law would render him liable to penalties for not fulfilling a contract. The by-law, he said, prevented him fulfilling this contract. The judge held that the petitioner had failed to show that, in the absence of the injunction, he stood to suffer irreparable injury, and that thus he had not advanced sufficient basis to warrant the issue of a writ. An appeal is to be entered. The judgment does not decide the legality of the by-law, which is being tested by another action by Mr. John Quinlan.

The Montreal Cut Stone Company has been formed for the purpose of manufacturing stone work, principally for small dwellings, but also for any large contracts. There is a considerable demand in the city for stone front work, which is now cut by hand in the old fashioned way. The gentlemen who have formed the company are of opinion that the work can be more economically produced and that much of the waste in stone can be saved. They have therefore installed a large plant, including five diamond saws, overhead cranes, etc., to handle this class of work.

A despatch from Sarnia states that the Northern Navigation Company intend making big changes in the company's docks and buildings at Point Edward. This included the erection of a combined storehouse and cold storage plant 90 by 60 ft. of wood with concrete foundation; a reinforced concrete laundry of steel structure of equal size to replace the present equipment at Sault Ste. Marie, and the extension of the westbound dock and warehouse so as to double its capacity. The volume of west-bound business handled by the company has increased so rapidly of late that these additions had become an absolute necessity. The estimated total cost is about $50,000.

American Road Builders' Convention

The city of Cincinnati has extended an invitation to the American Road Builders' Association to hold its Ninth Annual Convention and American Good Roads Congress in that city. This invitation has been accepted and the Convention and Congress will, therefore, be held in Music Hall Building, in Cincinnati, December 3rd, 4th, 5th and 6th, 1912.

The program will cover, without duplication, the practical questions relating to highway work, including the design of complete highway systems for cities and towns; detail plans for construction; the selection of materials for foundations and wearing surfaces; plant equipment for the construction of roads and pavements; problems of maintenance; cost data both for construction and repairs; the difficulties which confront the contractor on highway work; the development of courses of instruction in highway engineering in our technical schools and universities; the importance of research and experimental work; and other subjects directly related to the building and maintenance of good highways. Each of these subjects will be treated by experts in brief papers, leaving time for discussion from the floor. The program will not be overloaded with papers and the sessions will not be unduly protracted. Those in attendance will have an opportunity to inspect the exhibits without missing the papers and discussions.

There will be an exhibition of everything in the line of road building and street paving machinery, materials and appliances, which will include road crushers, culverts, and such materials as bitumens, cement, brick, wood block, etc. In addition to the exhibits of the manufacturers, a number of the principal cities will be assigned spaces in which to illustrate and describe their road systems, kind and extent of pavements, and materials used.

Extensive repairs are being made all along the line of the Kingston and Pembroke Railway. New platforms are being put in at all the stations and in a short time the whole line will be fenced in on both sides of the right of way.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Assiniboia, Man.

Sewers and water mains to cost $10,000. The town will install an electrically operated automatic sewer system, also a 4-in. water main. Clerk, Frank Ness; engineer, Mr. Rodgers.

Berlin, Ont.

Additional water mains planned. Supt. Hymen of Water Dept. in charge of work

Knowlton, Que.

The water system will be completely overhauled and repaired. New filter will be installed. Work under direction of the town council.

Macadamizing roads. The town council will borrow $13,000 from Provincial Government to be expended on the work.

Lachine, Que.

Dredging. Tenders received by Dom. Govt. Dept. of Public Works, Sec., R. C. Desrochers, Ottawa, until Nov. 6th Specifications, etc., at office of Dept., Ottawa, and MacLean Daily Reports, Toronto and Montreal.

Ottawa, Ont.

City Council will purchase 3 electric pumps. Clerk, J. Henderson. Engineer, N. Storrie.

Paving. Board of Control, engineer, N. J. Ker, have decided to pave Mosgrove street with asphalt this year. Plans will be prepared at once. Scoria blocks will be used in track allowance.

Point Grey, B.C.

Clearing and grading, etc. Sec., B. A. Cunliffe, Kerrisdale. Engineer was instructed to prepare estimates for the following: Laying sidewalk on Clere road from 38th avenue to Bodwell road and on 14th avenue between Sasamat and Trimble streets, grading 13th ave. from Imperial to Trimble street, clearing lane from Blanca to Drummond streets and streets between Fremlin, Dixon and Park and laying asphalt sidewalk on McDonald from 41st to 49th ave.

River Glade, N.B.

Water tower, dam, etc. for Jordon Sanitarium Commissioners. President, J. K. Flemming. Sec., Dr. David Townsend. It is planned to erect a tower to provide fire protection, to construct new road from Sanitarium to railway station, build dam across river and create an artificial lake.

St. Laurent, Que.

Water works system and filtration plant. Sec.-treas., C. S. Tasse, M. P. Council have granted a 25 year franchise for the supply of water to the Franco-Belgian Syndicate, 502 Transportation Bldg,, Montreal. They will begin immediately to construct and operate system and plant. Pipes, pumps, valves, hydrants, meters, engines, boilers, etc., required.

Toronto, Ont.

Tile pipe sewers on Davenport road, Beaver avenue, Brockton Place, Nairn avenue, Earlscourt avenue and lane first north of Queen. Tenders received by Mayor until noon, November 5th. Plans and specifications at office of engineer, Sewers Dept., City Hall. Mayor, H. C. Hocken. Commissioner of Works, R. C. Harris.

Cast iron pipe. Tenders received by Mayor until noon, November 5th, for about 2,700 ft. 30-in. cast iron pipe, also special castings and 8 bands for 12 approximate 30-in. castings, and one 12-in. valve. Plans and specifications at engineer's office, City Hall. Mayor, H. C. Hocken. Commissioner of Works, R. C. Harris.

Twp. of Stanstead, Que.

Roadways planned. Address secretary at Smith's Mills, Que. Municipality will borrow $50,000 from Provincial Government to be expended on ten miles of highway roads.

Winnipeg, Man.

Well machinery and pipe, etc. Board of Control. Sec., M. Peterson. Plans and specifications at office of engineer, H. N. Ruttan, 223 James avenue, for necessary building machinery and equipment. Power line construction and pipe line to new wells. Tenders received by secretary until Nov. 15th.

Woodstock, Ont.

Sewers. Clerk, Jno. Morrison. Council have decided to lay several glazed tile sewers and cement curbs. Tenders will be called shortly.

Roadways. The town council plan to repair a number of roadways and rebuild sections. Tenders will be called as soon as material is decided on. Clerk, John Morrison. Chairman Board of Commissioners, Scarff.

CONTRACTS AWARDED

Ottawa, Ont.

Asphalt pavement to cost $7,153 on Powell avenue from Bank to Lyon. Engineer, N. J. Ker. General contractor, Ottawa Construction Co., Elgin street.

St. John, N.B.

Watermain and platform. Clerk, H. E. Wardroper. Commissioner of Water & Sewerage, R. Wigmore. Engineer, Wm. Murdock. Contract for digging trench for watermain on Duke street awarded to Fred. Neil, City Hall (to be installed next year). Contract for building platform at Pettingell Wharf awarded to Jno. A. Adams, 128 Queens W.E.

Railroads, Bridges and Wharves

Albert, N.B.

Wharf and approach. Tenders received by Dom. Govt. Dept. of Public Wks.; Sec., R. C. Desrochers, Ottawa, until Nov. 18th. Specifications, etc., at office of F. G. Goodspeed, district engineer, St. John, N.B., Postmasters at Albert, Moncton, Hillsboro and Sussex, Dept., at Ottawa, and MacLean Daily Reports, Toronto and Montreal.

Bristol Corners, Que. Twp. Bristol, Co. Pontiac

Station for C. N. O. R. Location has been approved and plans will be prepared.

Hochelaga, Co. Que.

The C. N. O. Ry. Company's location of railway through Hochelaga Co. from mileage 55.23 to 59.42 has been approved.

Innerkip, Ont. Twp. East Zerra, Co. Oxford

Station planned for C. P. Ry. Proposed location has been aproved.

Marysville, N.B.

Station and freight sheds for Gibson & Minto Ry. Co., c/o R. B. Hanson, Fredericton, N.B. Site has been purchased and plans will be prepared.

Montreal, Que.

Bridges. C. N. O. Ry. has been authorized to construct bridge across St. Lawrence Blvd. and St. Denis Blvd. by means of overhead structures.

Pointe Bleue, Que.

Station. James Bay & Eastern Ry. Company's location at Pointe Bleue, Twp. Ouiatchoran, Que., has been approved.

St. Catharines, Ont.

Bridge. (1¼ miles north). G. T. Ry. Co. have been authorized to reconstruct bridge over Welland Canal.

Shaganappi, Alta.

The C. P. Ry. Co. have been authorized to construct spur for the Tregillus Clay Products Co.

Toronto, Ont.

G. T. Ry. Co. has been authorized to construct sidings for the Massey-Harris Co. Ltd.

Vermillion, Alta.

Railway contruction for Canadian Northern Railway, Winnipeg, Man. District engineer, H. F. Forest, Winnipeg. Grading will begin on line running from Vermillion to Medicine Hat as soon as surveys are made.

Victoria, B.C.

Esquimalt & Nanaimo Railway Co. have been authorized to construct spur for the Shawinigan Lake Lumber Co., Ltd.

Winnipeg, Man.

Terminal station. Winnipeg Electric Street Railway Co. have purchased land in Kildonan between Carruthers and McArthur streets as a suitable site.

CONTRACTS AWARDED

Bridgeport, N.S.

Iron bridge for Dominion Coal Co.,

Ltd., Glace Bay. Traffic manager, J. S. Isaac. General contractors, Sydney & Louisburg Railway Co., Sydney. Plans and specifications at office of owners.

Fort Frances, Ont.
Station for C. N. Ry., Winnipeg, Man. Chief engineer, W. M. McLeod, Winnipeg. Architect, R. B. Pratt, Union Station, Winnipeg. General contractor, J. H. Simmons, 275 Oakwood avenue, Winnipeg. 1½-sty., 147 x 24, brick and stone construction, metallic shingles.

St. Eustache, Que.
Bridge and macadam roadway. Sec.-treas., Hector Champagne. General contractor for bridge, Farley & Martel. General contractor for roadway, Adelard Leharette.

St. Joachim De Chateauguay, Que.
Iron bridge (over St. John River) Sec. Treas., Fortunat Laberge. General contractors, L. A. Content & Louis Duranceau, Chateauguay Basin, Que.

Stobie Mine, Ont.
Sub-station for the Canadian Copper Co., Copper Cliff, Ont. Mechanical engineer, G. E. Silvester. 2-sty., stone foundation, pressed brick and structural steel construction. Foundation in.

Winnipeg, Man.
Engine house to cost $18,000, Arlington street, for Canadian Pacific Railway. Architects and general contractors, Carter-Halls-Aldinger Co., 1010 Union Bank Bldg. 1-sty., 58 x 163, brick foundation and construction.

Public Building, Churches, Schools, etc.

Arrowhead, B.C.
Jail, etc. Prov. Govt., Dept. of Public Works. Minister, Hon. Thos. Taylor. Plans and specifications from Government Agent at Revelstoke and Department of Public Works, Victoria. Tenders received until Oct. 31, 1912.

Blenheim, Ont.
Skating rink for E. W. Knight, Talbot street. 200 x 75, cement foundations. Seating and all interior fittings required. Plans to be prepared.

Berlin, Ont.
Theatre building for the Star Management. Manager, Geo. O. Philip. Architect, W. Grayson, Hamilton. Seating capacity 1500. Plans will be prepared.

Brandon, Man.
Stable (Experimental Farm). Tenders received by secretary R. C. Desrochers, Ottawa, Dom. Govt. Dept. of Public, until Nov. 6. Specifications, etc., at office of H. E. Matthews, architect, Winnipeg, Man., Supt. Experimental Farm, Brandon, Dept. Ottawa, and MacLean Daily Reports, Toronto and Montreal.

Hamilton, Ont.
Alterations to building. The Knights of Columbus Home Association have purchased old building on Jackson St. W., and will remodel. New furnishings required. New club house will be erected later. Address Hugh Hennessey, 7 King E.

Maisonneuve, Que.
Post office to cost $200,000, Ontario street. Dominion Government, Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Architect, C. A. Reeves, 58 St. James street, Montreal. Plans are to be changed and a much larger building erected.

Montreal, Que.
Moving picture theatre to cost $4,500, 742 Notre Dame west, for Estate Boudreau, 58 St. James street. Architect, C. Bernier, 70 St. James street. Altering stores to theatre. Brick and structural steel construction, marble. Plans prepared.

Church to cost $25,000, 75 Inspector street, for Union Congregationalists. Pastor, Rev. H. B. Ganit. Plans in progress.

Perth, Ont.
Alterations Collegiate Institute to cost $10,000. Chairman, E. G. Molloch, or Dr. Hanna. Architects, Horwood, Taylor & Horwood, 130 Sparks street, Ottawa. Building will be enlarged and new gymnasium built. Plans prepared.

Phoenix, B.C.
Skating and curling rink to cost $8,000, for The Phoenix Exhibition & Carnival Syndicate. President and managing director, J. E. Thompson. Plans are being drawn under direction of committee, chairman, J. A. Morrin. 190 x 120, frame construction.

Raymond, Alta.
Temple to cost $150,000 for Mormon Church, headquarters, Salt Lake City, Utah. Plans in progress.

Regina, Sask.
Ladies residence to cost $30,000 in connection with college. (16th avenue) for Anglican Synod. Architects, Storey & Van Egmond, Northern Bank Bldg. Tenders called.

Sturgeon Falls, Ont.
Church for R. C. Congregation. Architect, C. Brodeur, 632 Albert street, Hull, Que. Plans and specifications may be seen at office of architect and Bishop Scollard, North Bay. Tenders received by Cure, Rev. C. Langlois, until Nov. 12. Stone construction.

Tilbury, Ont.
Interior fittings, post office. Tenders received by Sec., R. C. Desrochers, Ottawa, Dom Govt. Dept. of Public Wks., until Nov. 4th, 1912. Specifications, etc., at office of Mr. Asa Lang, Clerk of Wks., Tilbury; T. A. Hastings, Clerk of Wks., Postal Station F, Toronto, Dept., Ottawa, and MacLean Daily Reports, Toronto and Montreal.

Toronto, Ont.
Theatre to cost $9,000, Bloor and St. Clarens avenue, for S. Bloom & Co., 978 Queen street. Architects, Redmond & Beggs, Kent. Bldg., are preparing plans. Brick foundation, brick and structural steel construction.

Victoria, B.C.
Observatory planned for Dom Govt. Meteorological Dept. Supt. in charge, Mr Haynes Reed and Mr F. Napier Denison at the Victoria Branch of the Meteorological Service. $10,000 has been appropriated for purchase of site.

A committee has been formed and is canvassing the city for funds for the erection of a new Y. M. C. A. building.

Church to cost $100,000 for the Congregation of the First Baptist Church. Architect, Jesse M. Warren, Central Bldg. Excavating contractor, James Richards. 110 x 135, brick and steel construction. Tenders called for plumbing, heating and wiring.

Winnipeg, Man.
Church for Maryland street Methodist Congregation. Pastor, Rev. A. T. Hamilton, 572 Maryland street. Seating capacity 1200. Plans in progress.

CONTRACTS AWARDED

Chatham, Ont.
Addition to Catholic Hospital building to cost $30,000. Architect, Jas. L. Wilson & Son. General contractor, Blonde Lumber Co. Iron and steel, Chatham Bridge Co. 3-stys. and basement. 96 x 46.

Toronto, Ont.
Alterations to hall, etc., to cost $9,000, cor. Queen and Dovercourt road, for Royal Templars of Temperance, Queen and Dovercourt road. Sec., George Hurst, 494 Dufferin street. Architects, Gordon & Helliwell, Confederation Life Bldg. Brick construction.

Theatre to cost $7,000, Roncesvalles avenue. Owner and builder, D. M. Gilpin, 371a Dundas street. 2-sty., brick, structural steel, stone foundation.

Vancouver, B.C.
Moving picture theatre to cost $40,000, 845-51 Granville street, for Pacific Amusement Co., Pacific Bldg. Architect, C. P. Gregory, Lee Bldg. General contractors, Chas. L. William & Co., 319 Pender street west. 2-sty., 50 x 120, concrete foundation, brick construction, pressed brick and terra cotta facing.

Vernon, B.C.
Armoury to cost $16,811. Dom. Govt. Dept. of Militia & Defence. Sec., E. F. Jarvis, Ottawa. General contractor, T. E. Crowell, Vernon. Heating and plumbing, J. E. Ross, Seymour avenue, Vernon. 1-sty., 60 x 100, cement foundation, brick and structural steel construction.

Winnipeg, Man.
Rink to cost $50,000 for Granite Curling Club. General contractor, Thos. Holly & Son, 344 Portage avenue. Steel work, Wisconsin Bridge & Iron Works, c/o architect. 3-sty., 140 x 195, structural street, brick and terra cotta; 9 sheets of ice. Other tenders being received by architect.

Business Buildings and Industrial Plants

Atlin, B.C.
Hotel to cost $30,000 for The White Pass & Yukon Railway. Site has been chosen and work will start in spring.

Berlin, Ont.
Office building planned for the Economical Fire Insurance Company. President, Jno Fennell. Ward H. Bowlby, Director, has the matter in hand. Site has been secured on Queen street.

Calgary, Alta.
Store and room to cost $25,000 for Mr Getten, c/o Alberta Fur & Hide Co., 8th avenue E. 3 or 4 storeys, 25 x 130, cement foundation. Plans in progress.

Machine shop to cost $10,000 planned for Canada Malting Co. Machine tools, lathes, etc., required.

Store and apartment to cost $9,000 Bridgeland. Owner and builder, H. S. Mick, 111 8th street N.E. 2-sty., 55 x

H. cement foundation, brick construction. Tenders received by owner.

Addition to laundry to cost $60,000 for The Ontario Steam Laundry, 5th avenue and 2nd street E. Manager, Mr. Christy. Main building 90 x 200, solid concrete construction. Sheds, 50 x 105, stables, 52 x 60. Plans in progress.

Comox, B.C.

Saw mill to cost $100,000, for The Canadian Western Lumber Co. (MacKenzie & Mann). Plans in progress.

Edmonton, Alta.

Wood preserving plant for Alex. Bruce & Co., head office, 68 Gordon St., Glasgow, Scotland. Canadian office, Fort Frances, Ont. Company are negotiating for site and plans will be prepared.

Fraser Mills, B.C.

Factory for Canadian Wheel & Wagon Co. 10 acre site purchased and plans will be prepared.

Fredericton, N.B.

Foundry and machine shop for Willis McPherson. Site is under consideration and plans will shortly be prepared.

Guelph, Ont.

The Page-Hersey Iron & Tube Company, York road, contemplate adding a large quantity of the most modern equipment to their plant shortly and will take up the matter at once of having a fixed assessment, with the city, if this is granted a new $50,000 factory will be added.

Grand Forks, B.C.

Office and store to cost $12,000 planned for Boundary Trust & Investment Co. President, G. M. Fripp. Architect, A. C. Hontling. 1-sty., 50 x 30, and 80 x 90, brick construction, stone and concrete foundation.

Hamilton, Ont.

Pattern building and addition to foundry for Otis-Fensom Elevator Co., Victoria avenue N. Architects, Stewart & Witton, 2 Hughson street S. Tenders received until Oct. 31st for all trades except masonry. Pattern building 1-sty. 135 x 73, foundry addition 153 x 102, brick and steel construction, concrete tile roofing.

Addition to Arlington Hotel to cost $10,000, King William and Hughson Sts. Proprietor, Wm. Blake. Architect and general contractor, Geo. J. White, 165 Main street E. Steel girders and fire escapes required. Plans in progress.

Addition to factory for Canada Steel Goods Co., Arthur street. President, Arthur Hatch. Architects, Stewart & Witton, 2 Hughson street S. 2-sty., 150 x 120, brick, steel and concrete. Plans being prepared.

Moose Jaw, Sask.

Creamery for Saskatchewan Creamery Co., Utopia Blk. Architect, Thomas & Co., 5 Utopia Blk. Excavating, Jos. Battell, High street W. Tenders received for general contract too high. Owners considering calling for new tenders for construction next year.

North Battleford, Sask.

Hotel for Griese & Wood. Architects, La Chance & Favell. 4-sty., 50 x 120, cement foundation, brick construction. Plans drawn.

Preston, Ont.

Shop for Clare Bros. & Co., manufacturers stoves, ranges, furnaces, etc. Plans are being prepared and tenders will be called about December 1st.

Quebec, Que.

Office building to cost $20,000, St. Peter street, for Edmond Dube, Red Cross Pharmacy, Que. 4-sty., 40 x 60. Plans in progress, old building being demolished.

Regina, Sask.

Extension implement factory to cost $80,000, for Nichols, Sheppard Co. Tenders received by owners. 2-sty. and basement, 125 x 75, brick and heavy mill construction.

Addition to office building for Credit Founier Franco-Canadian Co., 35 St. James street, Montreal. Architects, Storey & Van Egmond, Northern Bank Bldg., are preparing plans.

Sutherland, Sask.

L. Robinson and J. Shrive will erect a large planing mill in spring on site covering 4½ acres. To be equipped for manufacture of special work and furniture.

St. John, N.B.

Remodelling and enlarging store building for F. W. Daniel & Co., Charlotte street. Manager, F. W. Daniel. Plans are being considered.

Toronto, Ont.

Factory, Parliament street, for C. W. Evans, Board of Trade. Architects, Designing & Draughting Co. Ltd., 36 Toronto street. 4-sty., 75 x 90, brick foundation, brick and structural steel construction. Plans in progress.

Vancouver, B.C.

Hotel to cost $225,000, Richards St., for T. B. Hyndman, 1220 Barclay street. 7-sty., reinforced concrete construction, pressed brick and terra cotta facing. Plans prepared.

Watrous, Sask.

Brick plant to cost $30,000 for The Co-operative Laundry Co. Equipment required. Plans in progress.

Windsor, Ont.

Addition to Victoria Block. A. L. Irion, 205 Ouelette avenue, wishes estimate for building 2 additional storeys, and also for a complete new block of office buildings.

Winnipeg, Man.

Stables for A. Finklestein, 50 Austin street. Brick construction to accommodate 100 horses. To be built on East side Maple street between McDonald and Henri Ave. Plans prepared.

Factory to cost $4,500, Corydon Ave. E., for Daylight Prism & Art Glass Co., (R. C. Sharpe). Architect, Geo. Teeter, 604 Bldrs. Exchange. Two storeys, 20 x 60, frame and corrugated iron construction, corrugated iron roofing. Plans prepared. Work to start this fall.

Warehouse and offices (McPhillips) for Bradford Wright Co., Ltd. Architect, C. W. V. Chivers, Keewayden Bldg. 2-sty., 212 x 184, frame construction. Tenders called.

Stable, Wellington Cres., for W. T. Alexander, 346 Main street. 1½-sty., brick construction, to accommodate 8 horses. Caretaker's quarters on second floor. Plans prepared.

CONTRACTS AWARDED

Brantford, Ont.

Addition to paint shop to cost $12,000, Mohawk street, for Adams Wagon Co., Ltd. Architect, Brantford Engineering Co. Builder and general contractor, A. E. Faulkner, 147 Erie avenue. 2-sty., 145 x 54, cement foundation, Milton pressed brick, structural steel and iron construction.

Brockville, Ont.

Extension to stove factory to cost $3,500, Water street, for The James Smart Mfg. Co., Ltd., Gourley street. General contractor, Wm. Gray. Manager, J. Gill Gardner. 1-sty., 100 x 30, concrete foundation, concrete and brick construction.

Extension to stables to cost $3,900, King street E., for Arthur C. Hardy, Fulford Block. Architect, A. Stuart Allaster. Work being done by day labor under architect's supervision. 2½-sty., 18 x 30, stone foundation, frame construction.

Calgary, Alta.

Store and residence to cost $4,000. Owner and general contractor, S. Sorsinsky, 4th avenue E. Architect, H. Ernest, 234 7th avenue E. 2-sty., 30 x 36, cement foundation, frame construction.

Store to cost $5,000, 17th avenue E. Owner and general contractor, L. Frank 1032, 17th avenue E. 2-sty., 28 x 50, brick, cement foundation.

Chatham, Ont.

Addition to store to cost $10,000, Market Sq., for Chas. Austin & Co. Architect, S. G. Kinsey. General contractors, Blonde Lumber Co. 3-sty. and basement, 34 x 120.

Cowansville, Que.

Warehouse for W. F. Vilas. Builder, A. Ross. 2-sty., 130 x 36, frame and metal siding. Excavation started.

Forest, Ont.

Enlarging factory for Forest Basket Co. President, Thos. Naylor. General contractor for storehouse, C. W. McCordic. General contractor for saw mill, Max Jamieson.

Fort William, Ont.

Stores, cost $4,000. Owner and builder, M. Leff, 482 Latin St., Port Arthur. Two storeys, 50 x 75, frame, cement foundation.

Elevator, Cost $20,000, Pacific avenue, for N. M. Patterson, Fort William. Architects and general contractors, Hyland & Star, Minneapolis. 42 x 42. Capacity 54,000 bushels.

Hamilton, Ont.

Structural steel building to cost $10,000. Owners and Builders, Hamilton Steel Construction Company, Lottridge street. President, D. C. McIlroy. Crane required.

Addition and alterations to store and apartments to cost $7,000., for A. E. Drewery, 140 Markland avenue. Architects, Brown & Fryer, Lister Chambers. Mason and carpenter, J. Evans, 237 Hunter street W. Brick, concrete and terra cotta construction; store fixtures and fronts required.

Kelowna, B.C.

Addition to plant to cost $26,000, for British North America Tobacco Co. Ltd. Architect, P. Edmund Corby. General contractor, Geo. A. Bowser. Masonry, C. G. Clement. Heating, Morrison-

Thompson Co. 140 x 40, reinforced concrete construction.

Montreal, Que.

Factory, cost $7,000, for R. C. Jamieson & Co., Ltd., St. Patrick street. General contractors, D. G. Loomis & Son, 1112 St. Patrick. One storey, 42 x 24, corrugated iron and tile construction, cement foundation.

Addition to stores and residence, cost $7,000, 234 Sherbrooke, for Hon. F. L. Beique, Transportation Bldg. General contractors, Guertin & Bouchard, 410 Parthenais. Brick, structural steel and stone construction.

Store and residence, cost $10,800, Urbain and Rachel street. Owners and general contractors, Dobrofsky & Bernstein. Three storeys, 24 x 116, cement foundation, brick veneer construction. Excavation started.

Refinery to cost $7,200, Prefontaine. Owner and builder, F. A. Lallemand Ref. Co., 6th Duluth avenue W. 3-sty., 30 x 100, cement foundation, brick and reinforced concrete construction. Foundation in.

Store to cost $4,200, Joliette. Owner and builder, W. Chatillon, 265 Lasalle. 2-sty., 25 x 26, cement foundation, brick construction.

Store and residence to cost $6,000, Ontario E. Owner and builder, W. Chatillon, 265 Lasalle avenue. 3-sty., 24 x 60, cement foundation, brick construction.

Store and residence to cost $7,500, Ontario E., for Mad. L. T. Venne. Architect, Jos. Venne, 5 Beaver Hall Hill Sq. General contractor, G. Bail, 102 Stadacona. Three storeys, 25 x 60, pressed brick, cement foundation.

Addition to store and factory to cost $5,000, Urbain and Dorchester, for H. Lovenauf, 20 Pine avenue W. Architect, Dufort & Decary, 25 La Patrie. General contractor, M. Hootner, 641 Sanguinet. Changing church into stores and factory, brick construction.

Alterations to store to cost $4,200, for Dupius Freres Ltd., 447 St. Catherine E. Architect, P. J. Turner, 121 Board of Trade. General contractor, Alf. Mercure, 419 Labrecque. Extending building in rear and changing to store front, brick foundation and construction.

Stores to cost $7,000 for Raoul Senecal, 180 Cuvillier. General contractor, A. Menard, 910 Drolet. 3-sty., 45 x 50, cement foundation, brick construction.

Store and residence (alterations) to cost $4,200, for Joseph Versailles, 99 St. James street. General contractor, L. Brosseau, c/o owner. Brick construction.

New Westminster, B.C.

Auto show room and stores to cost $25,000 (Carnarvon and Lorne) for Vetenhall & Hill. General contractors, Smith & Whitaker, Ellard Blk. 2-sty., 132 x 52, concrete foundation, brick construction.

Stores and apartments to cost $10,000, 8th street and 6th avenue, for E. Storme. General contractors, Smith & Whitaker, Ellard Block. 2-sty., concrete foundation, brick construction.

Quebec, Que.

Store and residence to cost $25,000, St. Joseph street, for Jos. Vermette. Architect, R. P. Lemay, D'aiguillon St. General contractors, Jos. Villeneuve, iron and steel, Eastern Canada Steel & Iron Works Ltd., 508 Coristine Bldg., Montreal. Roofing, N. Barbeau, 36 Bridge street. Ptg., J. Villeneuve. Htg., plmbg. and electric work, R. P. Giguire & Co. 4-sty., 62 x 42, Scotch brick and steel construction, stone foundation.

Factory addition, cost $50,000, Crown street, for Rock City Tobacco Company. Architect, R. P. Lemay, D'aiguillon St. General contractors, Jinchereau & Lamonde. Iron and steel, Eastern Canada Steel & Iron Works, Ltd., 508 Coristine Bldg., Montreal. Six storeys, 125 x 40, stone foundation, brick and structural steel construction, concrete.

Extension to garage and repair shop, cost $5,000, for P. T. Legare, Limited. General contractors, Jinchereau & Lamonde. One storey, 50 x 30, brick and structural steel construction, stone foundation. Excavation started.

Regina, Sask.

Manufacturing plant to cost $20,000, Scarth street, for B. F. Fell. Architect, S. J. Tripp, Scarth street. General contractors, Smith Bros. & Wilson. 3-sty., concrete and steel construction, 25 x 30. 12-ton steel oven required.

St. John, N.B.

Casket warehouse, Mecklenburg St., for Jno. Chamberlain (undertaker) 164 Mill street. General contractor, F. C. Messenger, 179 City road. 3-sty., concrete foundation, frame construction.

Stratford, Ont.

Factory to cost $50,000, Ontario St., for MacDonald Thresher Co., Erie St. General contractors, Pounder Bros. 4 buildings, 1-sty., 40 x 45, 100 x 40, 430 x 80, 130 x 94.

Swift Current, Sask.

Offices and pool room for Harold A. Yager. Architects, Reilly, Dawson, Hancock & Reilly, 20 Russell Bldg., Moose Jaw. General contractors, Peter Lyall & Son, Swift Current.

Toronto, Ont.

4 stores and residence to cost $25,000, Danforth avenue near Logan Ave. Owner and builder, Weismiller & McKenzie Bros., 1431 Queen street. 2-sty., brick construction, stone foundation.

Warehouse (addition) to cost $3,000, 41 Queen street W., for Gerhard Heintzman, 41 Queen street. Builders, Orr Bros., 35 Queen E. Cement foundation, brick construction.

Addition to store and garage to cost $3,000, corner Dupont and Spadina road, for Wm. Clark, 425 Avenue road. Builders, A. Clark & Son, 244 Augusta Ave. Stone foundation, brick construction.

Store and residence to cost $5,500, Langley & Carlaw avenues. Owner and builder, Robert Laxton, 583 Pape Ave. 2-sty., brick foundation, brick construction.

Vancouver, B.C.

Warehouse to cost $28,000, 39 Powell street, for A. F. Blackburn, Blackburn Hotel, Main street. Architect and general contractor, Hugh Murray, Blackburn Hotel. 4-sty., concrete construction, hot water heating; 1 electric elevator required.

Office building and hall to cost $70,000, Davie street, for Lester Dancing Academy. Architect, Thos. Hooper, 539 Hastings W. General contractor, J. J. Dissette & Co., Ltd., 530 Granville St. Stone work, Keast & Allen, 880 Beach avenue. Heating, Samuel A. Wye, 748 Cambie street. 3-sty., 66 x 132.

Addition to tent and awning factory to cost $20,000, for E. Lipsett, 68 Water street. General contractors, Baynes & Horie, 615 Hastings W. 2-sty. addition, brick construction.

Stores and apartments to cost $5,000, 5th avenue E., for Mrs. E. J. Robinson, 1047 Eveleigh street. Architect, Barwick Bros., c/o general contractors, Watson & Emery, 1350-15th avenue. 2-sty., frame construction.

Winnipeg, Man.

Factory (addition) for The Czerwinski Box Co., Logan and Tecumseh. General contractor, John MacQuarrie, 407 Nanton Bldg. 1-sty. addition, 90 x 120, brick construction. Wood working machinery required.

Carpenter shop and boiler room to cost $8,600, Union street. Owners and general contractors, The Stewart Sheaf Loader Co. Carpenter shop, 1½-sty., 60 x 90. Boiler room, 1-sty., 27 x 71. Cement foundation, brick construction.

Residences

Dunnville, Ont.

Residences. Monarch Knitting Co., Mgr., A. J. Burns, has purchased site and will have plans prepared for a number of new residences for workmen.

Montreal, Que.

Residence to cost $7,500, Barnier, for J. & E. Leonard, Sault au Recollect, Que. 3-sty., 50 x 68, cement foundation, brick construction. Plans in progres.

Residence to cost $6,000, for Savage & Lecocq, 213 St. Ferdinand. 3-sty., 35 x 40, brick construction, cement foundation. Excavation started.

Ottawa, Ont.

Residence to cost $6,200, Presten, for F. E. Latimer, 116 Frank street. 3 in a row, 2-sty., 47 x 41, cement foundation, brick veneer construction. Plans in progress.

Residence to cost $4,000, for C. O. Laclaise, 82 Murray. 2-sty., 30 x 51, stone foundation, brick veneer construction. Plans ready.

Apartment house to cost $25,000, Florence street, for Donald Fraser, O'Connor street. Architects, Horwood, Taylor & Horwood, Sparks street. Brick construction. Plans in progress.

Port Arthur, Ont.

Apartment house. Port Arthur Housing Corporation Ltd., has been formed with capital of $250,000, and have plans ready for 3-sty. apartment house, cement foundation, brick veneer construction, all modern conveniences. Company also planning to erect a number of residences next spring.

Toronto, Ont.

Residence to cost $9,000, Russell Hill Drive, for F. C. Brunke, 220 King street W. Architect, Designing & Draughting Co., Ltd., 36 Toronto street. Tenders received by owner. 2½-sty., brick construction, stone foundation.

Apartments to cost $15,000, Rowanwood avenue, for J. P. Milne, 101 Roxborough street. Architect, C. B. Hoyle, 6 Marlborough avenue. 2-sty. and base-

(Continued on page 71)

Tenders and For Sale Department

EXTENSION OF TIME

Notice is hereby given that the time for the reception of tenders for addition and alteration to Public Building, Paris, Ont., is extended to Monday, November 4, 1912.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, October 19, 1912.
43-44-66

Tenders for Drainage Work

Stanley Township

Tenders for Drainage Work (according to By-law No. 11, of 1911) estimated at 30,500 cubic yards, will be received by the undersigned up to **November 29th, 1912.**

All tenders must be accompanied by a marked cheque for ten per cent. of the contract price demanded.

Copies of By-law sent on application.

The lowest or any tender not necessarily accepted.

ROBT. J. RICHARDSON,
Clerk of Stanley Township,
Varna, Ont.
42-44-55

Sealed tenders addressed to the undersigned, and endorsed "Tender for Public Building, Midland, Ont.," will be received at this office until 4 p.m. on **Tuesday, November 5, 1912,** for the work mentioned.

Plans, specification and form of contract can be seen and forms of tender obtained at the office of Mr. Thos. Hastings, Clerk of Works, Postal Station F, Yonge Ctreet, Toronto, at the Post Office Midland, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, October 14, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department – 28359.
43-44-63

City of London, Ontario

Tenders for Wharncliffe Road Highway Bridge over Thames River

Sealed proposals, addressed to the "Chairman and Members No. 2 Committee," will be received at the office of the City Clerk until 5 p.m. on **Wednesday, November 13th, 1912,** for constructing and erecting a 270-foot span pin-connected Petit Truss Highway Bridge with necessary approach spans, concrete piers and abutments complete.

Each bidder shall name lump sum for the various parts of the work as described in the general specification and give price for any deductions or additions to the same and make his tender on the form furnished by the City Engineer.

Plans and specifications and form of tender may be seen at and obtained from the office of the City Engineer.

Contractors to enclose a marked cheque for ten per cent. (10 p.c.) of the amount of their bids.

The city reserves the right to reject any or all bids and to accept any bid.

W. E. ROBINSON, Chairman, No. 2 Committee.
GEO. E. WRIGHT, City Engineer.
43-45-64

Sealed tenders addressed to the undersigned, and endorsed "Tender for Wharfs and Dredging at Rimouski, Que.," will be received at this office until 4 p.m., on **Tuesday, November 12, 1912,** for the construction of a line of Wharfs and Dredging Tidal Basin at Rimouski, County of Rimouski, Que.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the offices of J. A. Tremblay, Esq., District Engineer, Montmagny, Que.; A. R. Decary, Esq., District Engineer, Post Office Building, Quebec; J. L. Michaud, Esq., District Engineer, Merchants Bank Building, St. James St., Montreal, and on application to the Postmaster at Rimouski, Que.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, Ont., October 14, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—28632.
43-44-65

LIMESTONE

150 acres white and buff limestone on Canadian Northern Ontario Railway, about 82 miles from Toronto. Suitable for crushing or building. Same deposit as Longford stone and over fifty feet deep in layers. Several good working faces. Earth covering varies from two to twenty-four inches or thereabout. Siding facilities.

W. M. SHIELDS,
O'Connell, Ont.
44-68

CITY OF KAMLOOPS, B. C.

Barriere River Hydro-Electric Power Plant Intake Dam and Flume System

Tenders will be received up to noon, **November 14th, 1912,** for the construction of Intake Dam and Flume System for the proposed Hydro-electric Power Plant on the Barriere River.

Plans and specifications may be seen at the office of the City Clerk, Kamloops, and at the office of Du Cane, Dutcher & Co., Consulting Engineers, Suite 911-914, Rogers Building, Vancouver, B.C. Each tender must be addressed to the City Clerk, in an envelope marked "Tender for Dam and Flume," and accompanied by a certified cheque amounting to five per cent. of the tender.

The lowest or any tender not necessarily accepted.

J. J. CARMENT,
City Clerk.
44-45-71

Department of Militia and Defence

Additional Targets, Long Branch Rifle Range

Notice to Contractors

Sealed tenders marked on the envelope "Tender for Extension, Long Branch Rifle Range, Toronto," and addressed to the Director of Contracts, Department of Militia and Defence, Ottawa, will be received until noon, **November 4th, 1912,** for the construction of Additional Targets at Long Branch Rifle Range.

Specifications may be seen and full particulars obtained at the office of the General Officer Commanding 2nd Division, Toronto, Ont., and the Director of Engineer Services, Headquarters, Ottawa.

Tenders must be made on the form supplied by the Department and accompanied by an accepted cheque on a Canadian Chartered Bank, for ten per cent. (10 p.c.) of the amount of the tender, payable to the order of the Honorable the Minister of Militia and Defence, which amount will be forfeited if the party tendering declines to enter into or fails to complete the contract in accordance with his tender.

The Department does not bind itself to accept the lowest or any tender.

EUGENE FISET, Colonel,
Deputy Minister.

Department of Militia and Defence,
Ottawa, October 7th, 1912.

Newspapers will not be paid if this advertisement is inserted without authority from the Department.
H.Q. 18-35-14.—29828.
44-67

Tenders for Installation of

Engines and Boilers

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, December 10th, 1912**, for the installation of one or more Fifteen Million Imperial Gallon Pumping Engines and Boilers at the Main Pumping Station.

Specification and tender form may he obtained upon application at the office of Mr. James Milne, Mechanical and Electrical Engineer, Department of Works, City Hall, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with or the tenders may be declared informal.

Tenderers shall submit with their tenders the names of two personal sureties approved by the City Treasurer, or in lieu thereof, the bond of a guarantee company approved as aforesaid.

The lowest or any tender not necessarily accepted.

H. C. HOCKEN, Mayor,
Chairman Board of Control
City Hall, Toronto,
October 22nd, 1912. 44-72

Naval Service of Canada

Notice Concerning Tenders for Timber Supplies

Sealed tenders addressed to the undersigned, endorsed "Tenders for Timber," will be received up to noon on **Tuesday, the 12th of November, 1912**, for the following description of timber, Birch, Cedar, Spruce, Pine, Oak, Fir, Teak, all being for delivery at H. M. C. Dockyards at Halifax, N.S., and Esquimalt, B.C. Forms of tender may be had by application to the undersigned or to the Naval Store Officer at either Dockyard.

Unauthorized publication of this notice will not be paid for.

G. J. DESBARATS,
Deputy Minister of the Naval Service.
Department of the Naval Service,
29529 Ottawa, October 8, 1912. 21-58

Tenders for Construction of

Municipal Telephone System

Sealed tenders addressed to James E. Quick, Reeve of Pelee, Scudder P.O., Ontario, will be received up to **Saturday, November 16, 1912**, at six o'clock p.m., for the construction of twenty four miles of Municipal Telephone Lines on Pelee Island, Ontario.

Tenders may be for work in whole, including putting in poles, stringing wires, installing instruments, etc., or individually for each portion of the work.

Parties tendering must satisfy themselves regarding location, route of lines, etc.

The lowest or any tender not necessarily accepted.

An accepted bank cheque equal to 10 per cent of the tender must accompany each tender as a guarantee of good faith.

Plans, specifications, etc., can be seen at the office of Wm. Stewart, Township Clerk.

Signed on behalf of Pelee Municipal Telephone Board.

JAMES E. QUICK, Reeve,
41-15-70. Scudder P.O.

Water Commission of the Town of Dunnville

Sealed tenders addressed to B. L. Edgecombe, Chairman of the Water Commission, will be received up to 9 p.m. on the **11th of November, 1912**, for one steel elevated tank of 100,000 Imperial gallons capacity and alternatively for one of 125,000 Imperial gallons capacity.

Specifications and instructions to bidders to be had on application to the undersigned.

ALAN MAIR JACKSON,
Superintendent.
44-15-49 P. O. Box 196, Dunnville, Ont.

Building For Sale

Sealed tenders will be received by the undersigned until **Friday noon, November 1st, 1912**, for

Elizabeth Street Old School Building

to be taken down and removed from the premises.

W. C. WILKINSON,
Secretary-Treasurer,
44-73 Board of Education, City Hall.

Town of Bassano, Alberta

WATERWORKS

The Corporation of the Town of Bassano, Alberta, invite tenders for the following:

Contract "T"
All labor and materials for constructing a concrete pump shaft, 130 feet deep, and laying 18-in. steel intake pipe in tunnel from shaft to Bow River, 225 feet in length, and constructing intake crib in river.

Contract "H"
All labor and materials for constructing frame power house at Bow River.

Contract "F"
All labor and materials for constructing frame frost casing for standpipe 25 feet diameter by 112 feet high.

Contract "P"
Supply and erection of a deep well pumping engine, or alternatively, of a centrifugal pump and steam turbine.

Contract "R"
Supply and erection of two return tubular steam boilers and stack.

Contract "S"
Supply and erection of a steel standpipe, 20 feet diameter by 100 feet high.

Plans and specifications for Contracts "T," "H," and "F" may be obtained from the John Galt Engineering Company, Limited, Winnipeg and Calgary, on deposit of cheque for $10.00, which will be returned to bona fide tenderers.

Specifications for Contracts "P," "R," and "S," will be sent on application to the Engineers.

Tenders, which must be accompanied by an accepted cheque for five per cent. of the amount of the tender, should be sent to the undersigned not later than 2 o'clock on Monday, November 18th, 1912.

The Corporation do not bind themselves to accept the lowest or any tender.

GEO. B. R. BOND,
Secretary-Treasurer.
Bassano, Alberta, October, 1912.

Board of Education

Sealed tenders, addressed to the Secretary Treasurer of the Board, will be received until

Friday Noon, November 1st, 1912,

for the following:

Malvern Avenue High School:

Plumbing
Heating and Ventilation
Electric Wiring
Heat Regulators

Western Ave. Public School:

Plumbing
Heating and Ventilation
Electric Wiring

and for

Sundry Schools:

Electric Light Fixtures
Bubbling Water Taps
Seating for Assembly Room
Cabinet Work
Commercial School Desks

Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, City Hall. Each tender must be accompanied by an accepted bank cheque for five per cent. of the amount of tender, or its equivalent in cash. Tenders much be in the hands of the Secretary Treasurer at his office in the City Hall not later than 12 o'clock noon on the day named, after which no tender will be received.

The lowest or any tender will not necessarily accepted.

W. W. HODGSON,
Chairman of Committee
W. C. WILKINSON,
44-71 Secretary Treasurer.
Toronto, Ont.

For Sale

Stone crusher, portable, with elevator. Also 16 h.p. gas engine, portable. Enquire Box 626, Contract Record, Toronto, Ont. 42-T.F.-58

Agents Wanted

Large United States manufacturer desires to appoint agencies in Canadian territories, where not already represented, for the best line of Concrete Waterproofing coatings made. Attractive proposition. Box 621, Contract Record, Toronto, Ont. 42-53 T.F.

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders—put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—331 Board of Trade
Toronto—220 King Street West
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. 11-t.f.

Electrical Apparatus For Sale Owing to Owners Having Changed over to Hydro-Electric

Electric Direct Current Material

1	1¾ h.p. d.c., 1800 rev. shunt wound.	$40.00
1	15 h.p. 500 volt d.c., 1200 rev. shunt wound	100.00
1—	Starting Compensator, Type 1, 550 volt	5.00
1	Westinghouse Auto Starter, 550 volt..	5.00
1—	McLachlan-Joy d.c. 5 h.p., 500 volt 2000 rev.	65.00
1—	Commutator for above	
14—	Thompson enclosed Arc Lamps ...	10.00
36—	Thompson enclosed Arc Lamps ...	10.00
4—	Westinghouse Enclosed Arc Lamps.	10.00
15—	Westinghouse Inner Globes	.15
27—	Can. Gen. No. 3 Inner Globes ...	.15
15—	Can. Gen. No. 4 Inner Globes ...	.15
650—	Solid ½x9½ Carbons, per M. ...	18.00
450—	Soft ½x9½ Carbons, per M. ...	18.00
50—	Solid ½x12 Carbons, per M.	25.00
50	Soft ½x12 Carbons, per M.	25.00

Taylor Forbes Company

Guelph, Ontario

40-39

Residences

(Continued from page 69)

ment, stone foundation, brick construction. Plans drawn.

Residence to cost $8,000, Indian Grove, for Mr. Scott, c/o architect, C. F. Wagner, 15 Toronto street. 2½-sty., brick, brick foundation. Plans drawn.

15 residences to cost $30,000, East Toronto, for L. C. Sheppard & Co., 17½ Adelaide street E. Architects, Designing & Draughting Co., 36 Toronto street. Brick, stone foundation. Plans in progress.

Vancouver, B.C.

Residence to cost $9,000, 16th avenue and Cypress street, for Dr. A. T. Fuller, 1055 Broadway W. Architect, R. J. MacDonald, 619 Hastings W. Concrete foundation, frame construction. Tenders called.

Apartment house to cost $16,000 (South) for J. H. Angleman, 940 Burrard street. Architect, A. J. Bird, c/o owner. 2-sty., frame construction. Plans prepared.

Apartment house to cost $75,000, 8th avenue W. Architect, T. H. Bamforth, 220 Riggs-Selman Bldg., 319 Pender St. W. 6-sty., 50 x 115, reinforced concrete construction, pressed brick, terra cotta facing. Plans prepared.

Victoria, B.C.

Residence to cost $35,000 (Uplands Prov.) for Andrew Wright, 1006 St. Charles. Architect, Philip M. Julien, Arts & Crafts Bldg., Vancouver. 54 x 72, stone, stucco and frame construction. Plans prepared.

Windsor, Ont.

Residences, Mercer street. V. Benoit, proprietor Wellington Hotel, has purchased site and will have plans prepared at once for a number of workingmen's homes.

Winnipeg, Man.

Residence to cost $20,000, Fort Garry Drive, for Adam Brown, Portage La Prairie. Plans in progress.

CONTRACTS AWARDED

Caledonia, Ont.

2 residences planned for The Alabastine Plaster Co. General contractor, Thomas Harkin.

Calgary, Alta.

Residence, W. Mt. Pleasant. Owner and builder, W. J. Wakeford, 1804 18th avenue N.W. 2-sty., 22 x 32, cement foundation.

2 residences to cost $5,000, Regal Terrace, for H. Boles. Builder, J. Holland, 836 3rd avenue N.W. 1-sty., 19 ft. 6 in x 32 ft. 6 in., frame, cement foundation.

Residence to cost $10,000, 18th Ave. W., for W. J. Wright, 9th avenue W. Builder, The Swanstrom Co., 323 Travis Blk. 2-sty., 40 x 48, cement foundation, brick construction.

Residence to cost $5,000. Owner and general contractor, A. Brown. Builders, Brown & Taylor, Box 1645. Two stys., 28 x 32, cement foundation, frame construction.

Residence to cost $6,500, Mt. Royal. Owner and builder, H. Templeton, 2314 4th street W. 1½-sty., 35 x 36, cement foundation, frame construction. Excavation started.

Residence to cost $4,000, Elbow Park. Owner and builder, J. G. Porteous, 610 24th avenue W. 2-sty., 24 x 34, frame, cement foundation.

Residence to cost $4,000, Hillhurst. Owner and builder, T. Thompson, 416 11th street N.W. 2-sty., 23 x 33, brick, cement foundation.

2 residences to cost $5,000. Owner and general contractor, J. R. Henderson, 1037 11th avenue. 2-sty., 19 x 40, cement foundation, frame construction.

Hamilton, Ont.

Addition and alterations to residence to cost $3,500, for C. A. Ross, 394 Queen St. Architects, Munro & Mead, Main & Hughson street. General contractor, J. Roberts, 12 Grove avenue.

Montreal, Que.

Residence, cost $20,000, Redpath Crescent. Owner and general contractor, E. G. M. Cape, 59 St. Peter street. Architects, Saxe & Archibald, 59 Beaver Hall Hill. Three storeys, 40 x 65, terra cotta and stone construction, stone foundation.

Residence to cost $10,000, Delorimier. Owner and general contractor, J. M. Guindon, 1116 Delorimier. Architect, J. R. Gadbois, c/o owner. 3-sty., 41 x 73, cement foundation, brick veneer construction.

Residence, Waverly. Owner and builder, Augustin Handfield, 2161 St. Urbain. 3-sty., 24 x 40, cement foundation, Roman stone. Foundation in.

Residence to cost $4,200, De Gaspe. Owner and builder, L. N. Germain, 2791 St. Andre. 2-sty., 25 x 40, cement foundation, brick construction.

Residence to cost $4,800, Nicolet. Owner and builder, Clovis Laganiere, 485 Nicolet. 3-sty., 25 x 40, cement foundation, brick veneer construction.

Residence to cost $4,800, for Wilfrid Pepin, 60 5th avenue. Builder, Antoine Marchand, 108 Hamilton. Cement foundation, brick veneer construction.

Residence to cost $4,800, Garnier. Owner and general contractor, Ulric Boileau, 474 Gifford. Architect, Viau & Verine, 76 St. Gabriel. 3-sty., 25 x 64, brick construction, stone foundation.

Residence to cost $5,400, Messier, for Wilfrid Ranger, 1213 Messier. Builder, Treffle Bellehumour, 1420 Messier. 3-sty., 25 x 42, cement foundation, brick veneer construction.

Residence to cost $7,200, 2541 Park avenue. Owner and builder, Omer Dansereau, 2546 Park avenue. 3-sty., 25 x 74, cement foundation, brick construction.

Flats to cost $7,200, St. Ferdinand and Richelieu. Owner and builder, Jos. Dupius, 82 Parc Cartier. 3-sty., 53 x 38, cement foundation, brick veneer construction.

Cottages to cost $11,000, Vendome. Owner and general contractor, D. H. Scott, 163 Grey avenue. Architect, W. A. Price, c/o owner. 2-sty., 46 x 41, cement foundation, brick construction.

Residence to cost $4,800. Owner and general contractor, Hector Paiement, 128 St. Peter. Architect, Art. St. Louis, 80 St. Gabriel. 2-sty., 38 x 45, stone veneer, stone foundation.

Residence to cost $4,400, Harvard. Owner and builder, A. Blouin, 467a Sivard. 2-sty., 30 x 40, brick construction, cement foundation.

Residence to cost $7,500. Owner and builder, R. Laberge, 122 Margaret St. 3-sty., 52 x 56, cement foundation, brick veneer construction.

Residence to cost $5,000, Chabot, for Alex. Robert, 1951 Bordeaux. Builder, Alb. Paradi, 193 St. Germain. 3-sty., 27 x 46, cement foundation, pressed brick construction.

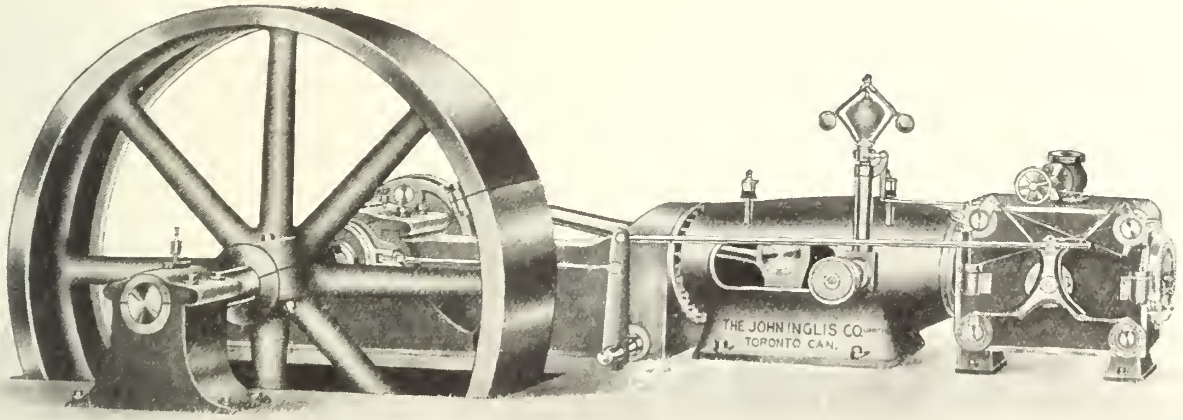
Residence to cost $9,000, Cartier. Owner and builder, F. Therrien, 324 Visitation. 3-sty., 46 x 42, stone foundation, stone construction. Excavation started.

Residence to cost $5,000. Owner and general contractor, N. Pageau, 257 Lagauchetiere E. Architect, C. Bernier, 70 St. James. 3-sty., 26 x 65, pressed brick construction, cement foundation.

Residence to cost $4,200, Bordeaux. Owner and builder, Albert Brouellet, 196 Marquette. 3-sty., 25 x 34, cement foundation, pressed brick construction.

Flats to cost $10,800, Fullum, for J. A. E. Bureau, 447 Mount Royal E. Ar-

EFFICIENCY CORLISS ENGINES


THE JOHN INGLIS CO.
TORONTO CAN.

The Inglis idea of building Corliss Engines means not only guaranteeing results but seeing to it personally that the right results are obtained.

The same quality that has made Inglis Pumps and Boilers pre-eminent is found in Inglis Corliss Engines.

These engines include all the good features common to all engines *plus* many *exclusive* and *better* features found only in the *Inglis* Corliss.

The Inglis Engine is the one you want in your power plant. It is an ideal modern power producer.

We ask you only to investigate. Then the decision rests with you without undue solicitation.

The John Inglis Co., Limited

ENGINEERS AND
BOILERMAKERS

Strachan Avenue, TORONTO

chitects, Asselin & Bronseau, 17 Place d'Armes Hill. General contractor, Paul Pauze, 543 Maisonneuve. 3-sty., 50 x 52, cement foundation, brick veneer construction

Flats to cost $12,000, St. Urbain, for L. Goldstein, 1063a St. Urbain. General contractors, Wilensky & Co., 1222 St. Urbain. 3-sty., 50 x 64, cement foundation, brick veneer construction.

Ottawa, Ont.

Residence to cost $3,500, Glen Ave. Owner and builder, A. H. Brown, 132 Hopewell. 2-sty., 32 x 30, stone foundation, veneer construction.

Point Grey, B.C.

Residence to cost $11,000, for J. H. Alexander. Architect, J. H. Bowman, 615 Pender street W., Vancouver. General contractor, M. G. Hoper, 1759 Broadway E., Vancouver. 2-sty., frame construction.

Residence to cost $10,000. Owner and general contractor, W. S. Pearcy, 1366 12 avenue W. 2-sty., frame construction, stone and concrete foundation.

Residence to cost $8,350, Shaughnessy Heights, for F. C. Taylor. Architects, Grant, Henderson & Cook, 413 Granville street, Vancouver. General contractors, E. Chrystal & Co., 540 Howe street, Vancouver. 2-sty., frame construction.

Quebec, Que.

Residence to cost $7,000, for Canton & Boivin, general contractors, Maisonneuve and Clairfontaine streets. Architect, J. Dussault, St. Johns, Que. Three storeys, 80 x 50, stone foundation, Scotch brick construction. Work being done by day labor.

Residence to cost $5,000, Lockwell. Owner and general contractors, O. Nolin. Architect, Raymond, St. Joseph St. 4-sty., 75 x 40, stone foundation, Scotch brick and structural steel construction. Work being done by day labor.

St. Andrews, N.B.

Summer residences to cost $6,000, for Douglas Seeley, 14 Seaforth avenue, Cote Des Neiges, Montreal, Que. General contractor, R. A. Clark, St. Andrews. 2-sty., 71 x 40, concrete foundation, frame construction, cypress finish.

St. John, Que.

Apartment house to cost $8,500, Clarendon street, for L. M. Owens, 284 Main street. Architect, L. Leonard Heans, 78 Paradise Row. General contractors, Brown & Belyea, Waterloo street.

Tillsonburg, Ont.

Residence, Ridout, for Wm. Armstrong, Portage la Prairie, Man. General contractor, R. Mills, R.F.D. No. 2, Courtland. Mason, Wm. Drake. Ptg. and glazing, G. W. Sober. Plmbg. and heating, Shearing & Flanders, Broadway. 1½-sty., 26 x 30, cement foundation, brick veneer construction.

Power Plants, Electricity and Telephones

Daysland, Alta.

Lighting apparatus. A. A. P. McDowell, c/o "The Daysland Press" wishes estimate on the installation of dynamo and storage batteries with necessary appurtenances for lighting building. 2-sty., 24 x 50, in connection with 3 h.p. gasoline engine or including a new 5 h.p. engine.

Regina, Sask.

Telephone Exchange building for Provincial Govt., Dept. of Public Works. Acting Deputy Minister, H. S. Carpenter. Architects, Storcy & Van Egmond, Northern Bank. Bldg. 2-sty., fireproof, steam heating, pressed brick and stone construction. Tenders to be called.

St. Jerome, Que.

Electric light plant. Engineers, Surveyor & Frigon, 56 Beaver Hall Hill, Montreal. General contractors, Allis-Chalmers-Bullock Ltd., 613 Canadian Express Bldg., Montreal.

Salmon Arm, B.C.

Electric apparatus, etc. Con. Engrs., Dutcher, Mexwell & Co., 319 Pender St. W., Vancouver. Field generator, etc., Can. Westinghouse Co., 602 Hastings street W., Vancouver. Diesel oil engine, E. P. Kay Co., Helmoken street. Engineers will receive tenders for the erection of a power house, brick or concrete construction.

Saskatoon, Sask.

Electric apparatus to cost $150,000. Clerk, Andrew Leslie. The Electrical Department will require a supply of meters, transformers, poles, cross arms and general electrical equipment for lighting system for 1913.

Winnipeg, Man.

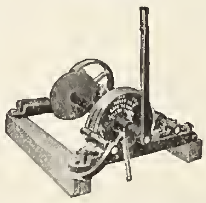
Ornamental street lighting will be extended north on Main street from C. P. R. tracks to city limits. Board of Control. Sec., M. Peterson. Engineer, J. G. Glassco, 54 King street.

"EBANO" and "EAGLE" Brands
MEXICAN ASPHALT

HERKIMER ST., HAMILTON. Paved with our Mexican Asphalt.

Write for analysis and samples

The
Asphalt & Supply Company, Limited
Sole Canadian Agents for the Mexican Eagle Oil Co.
Also Agents for MASTIC ASPHALT for Sidewalks.
428 Transportation Bldg., MONTREAL



Have You Reckoned?
what you can save on your labor cost by using
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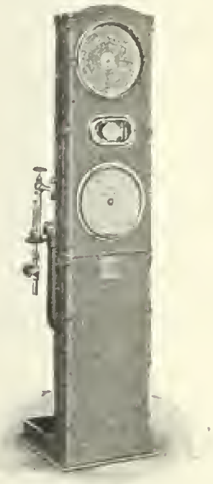

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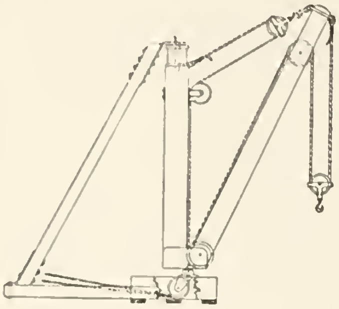

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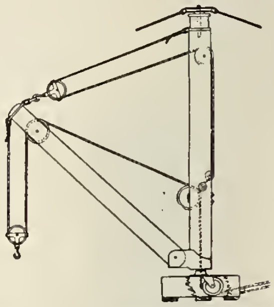

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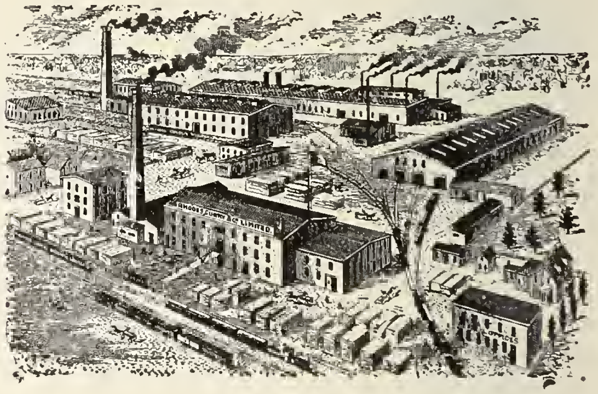

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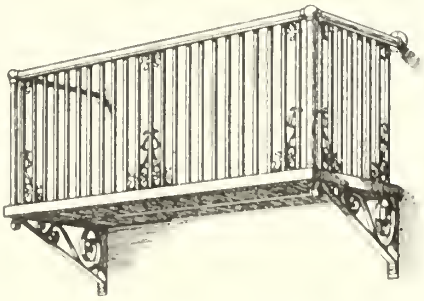

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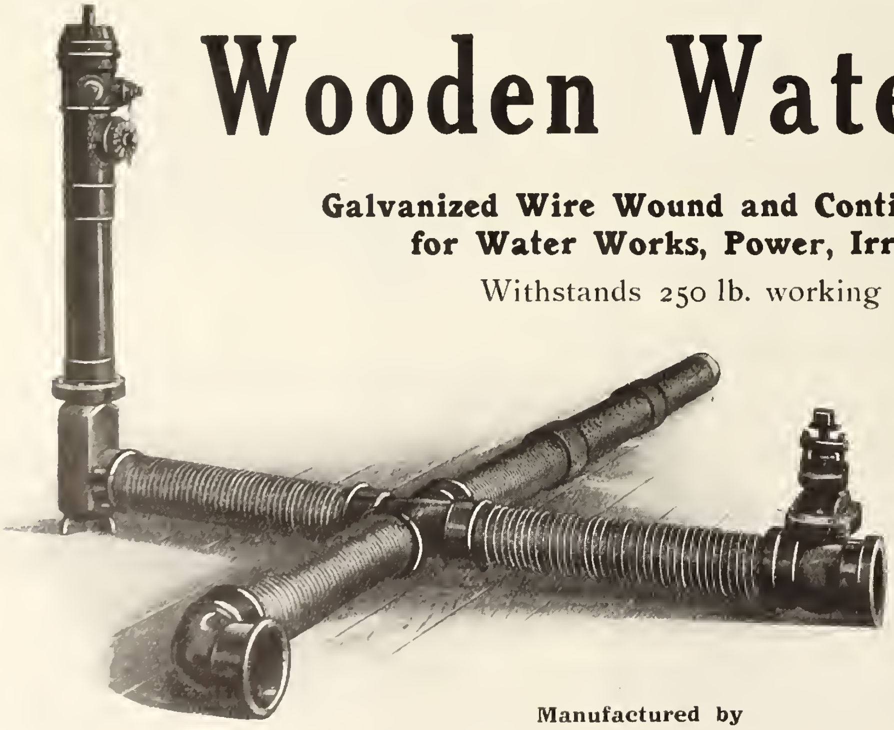

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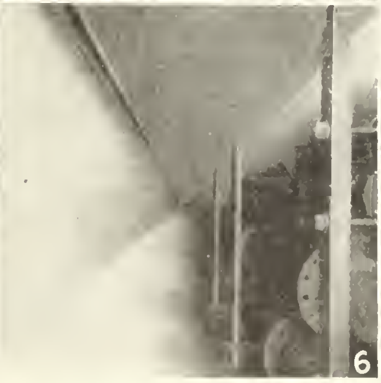

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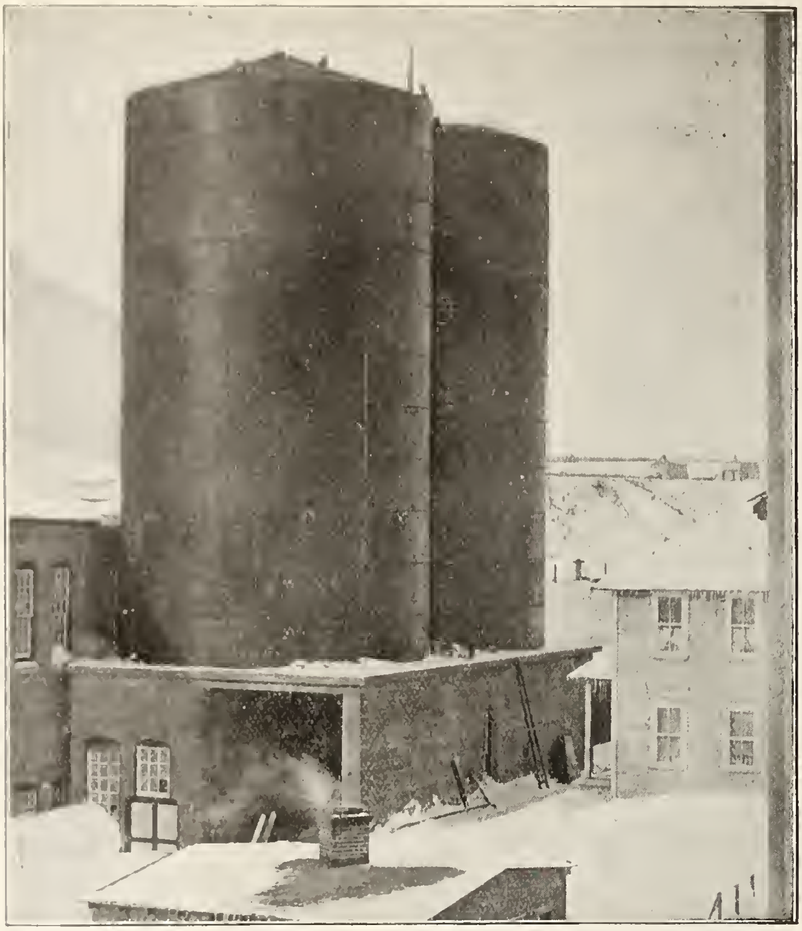

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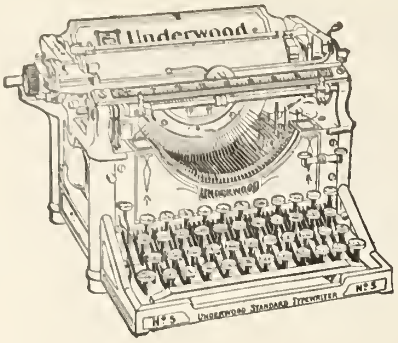

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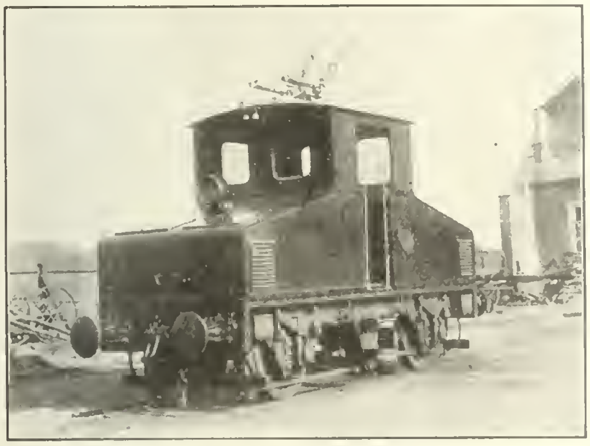

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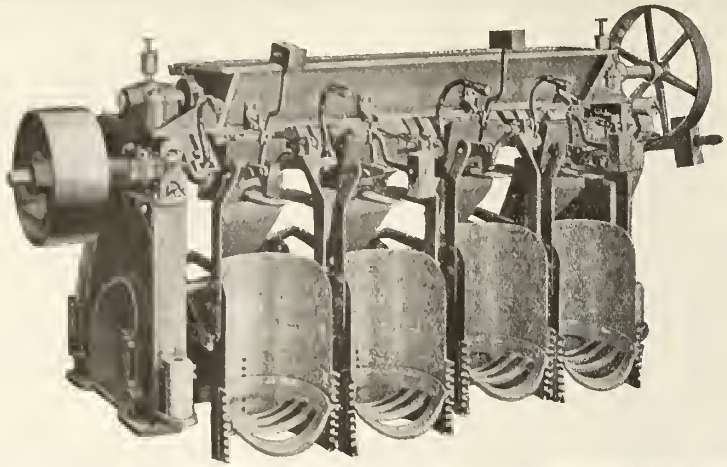

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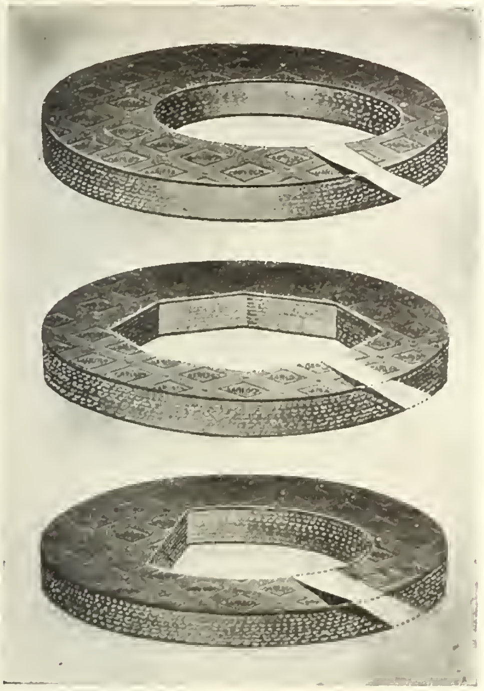

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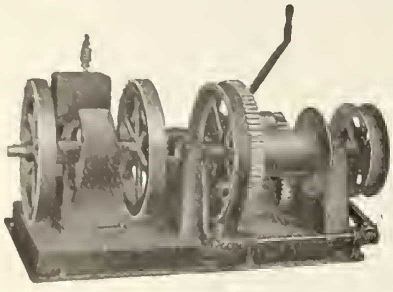

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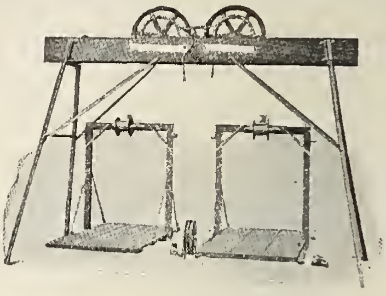

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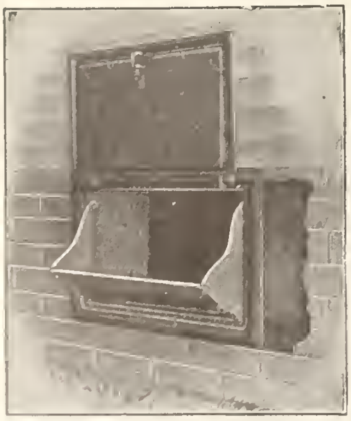

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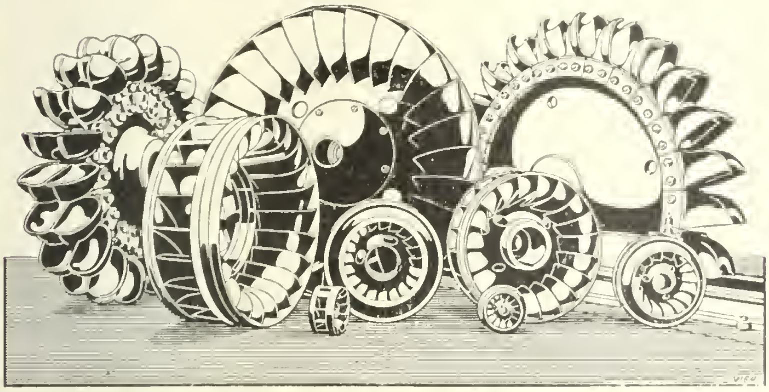

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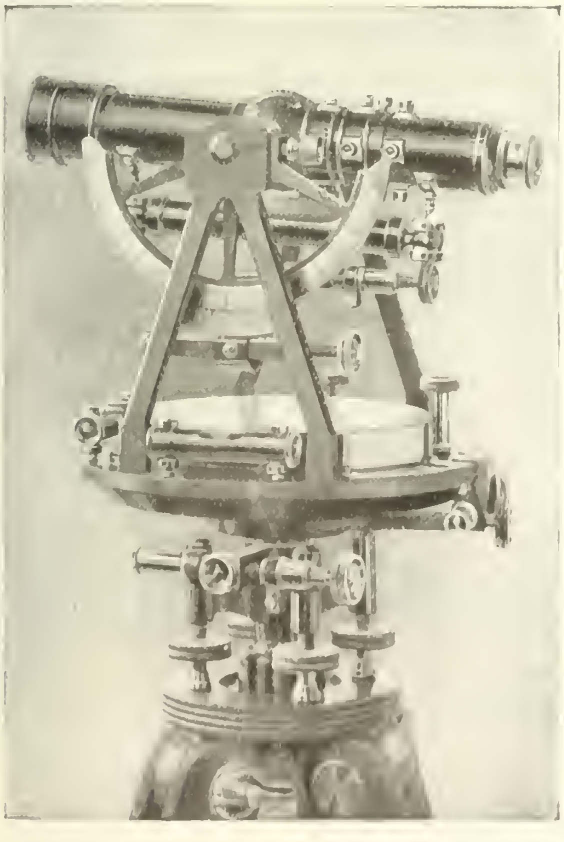

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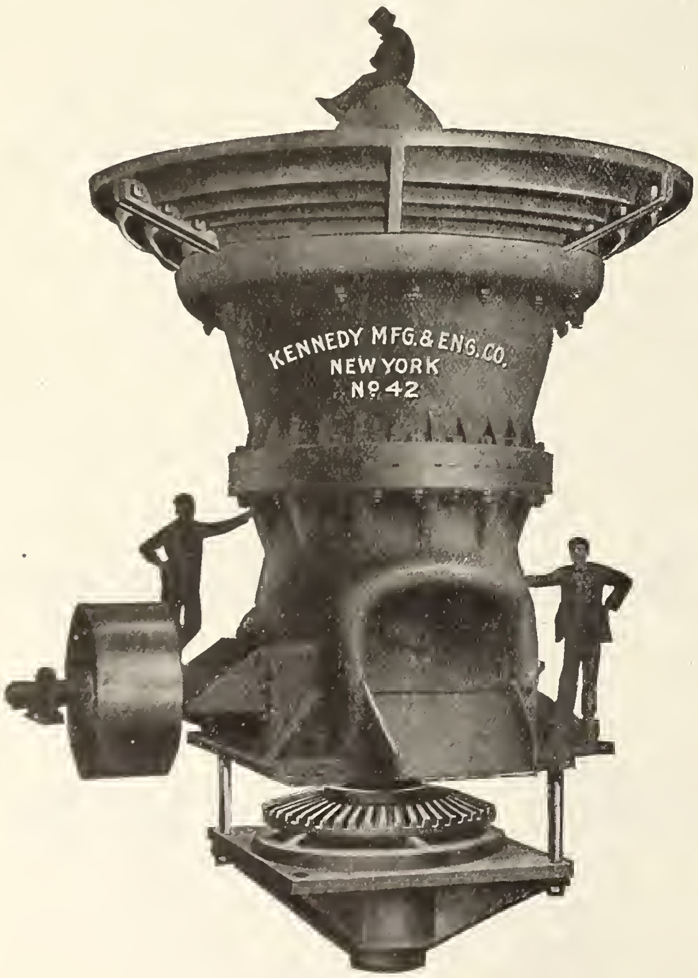

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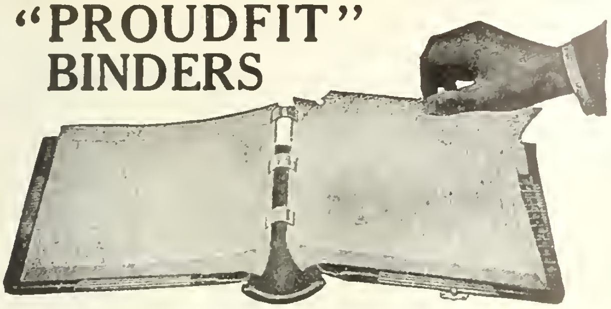

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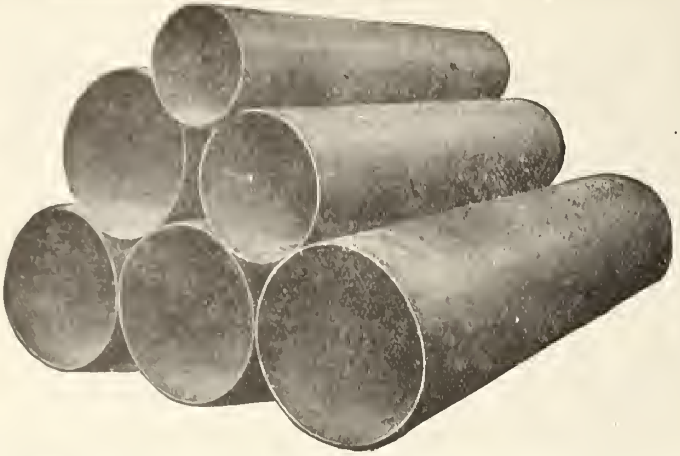

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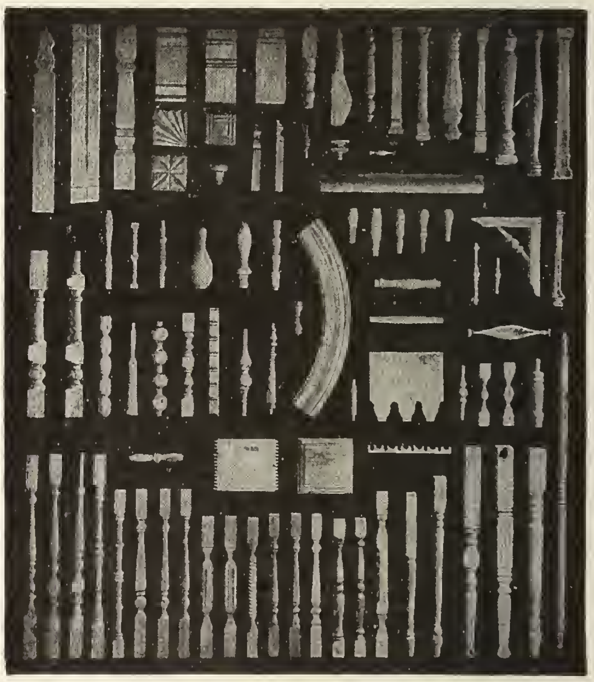

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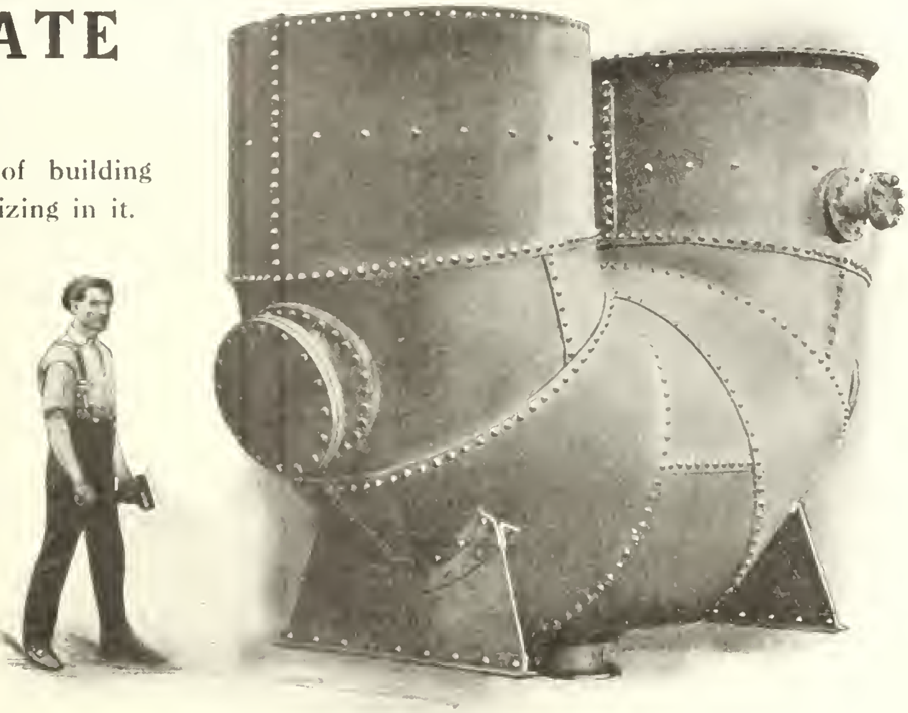

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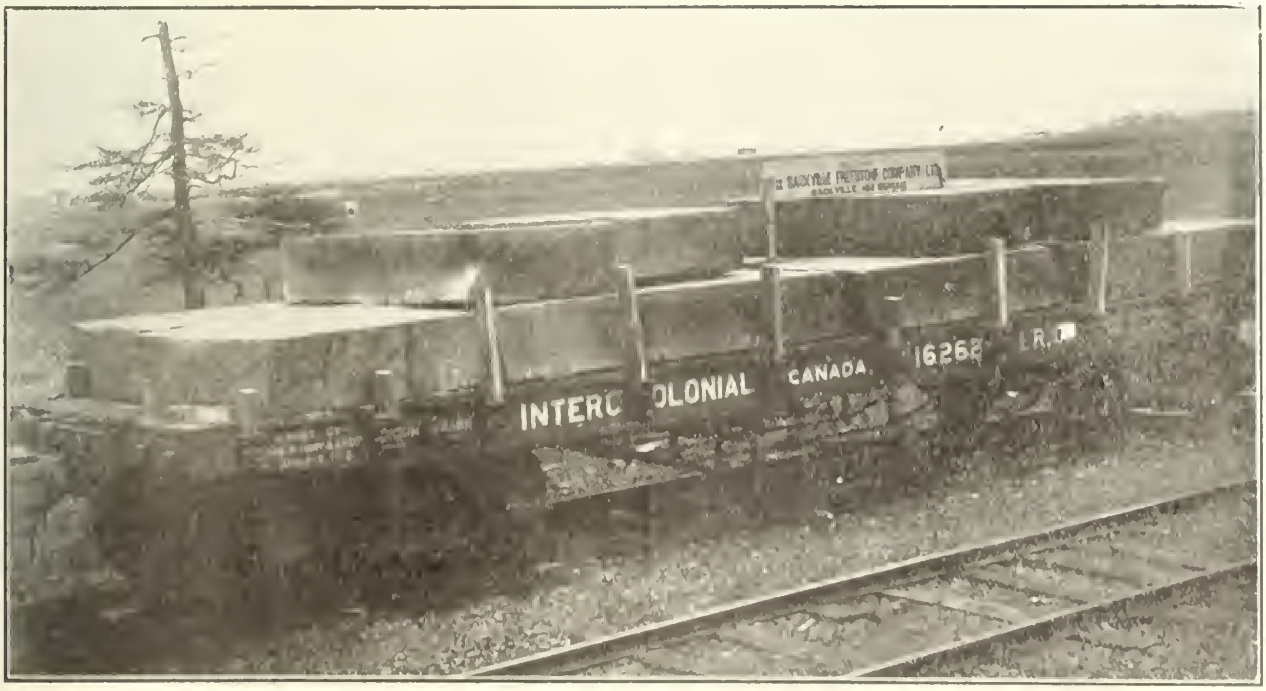

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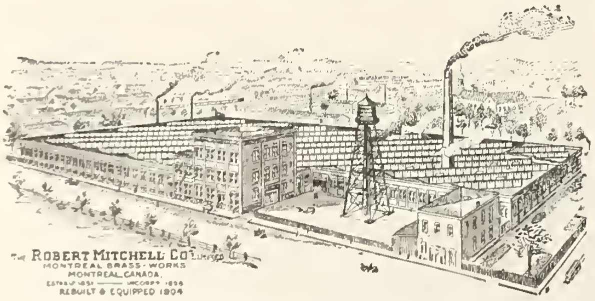

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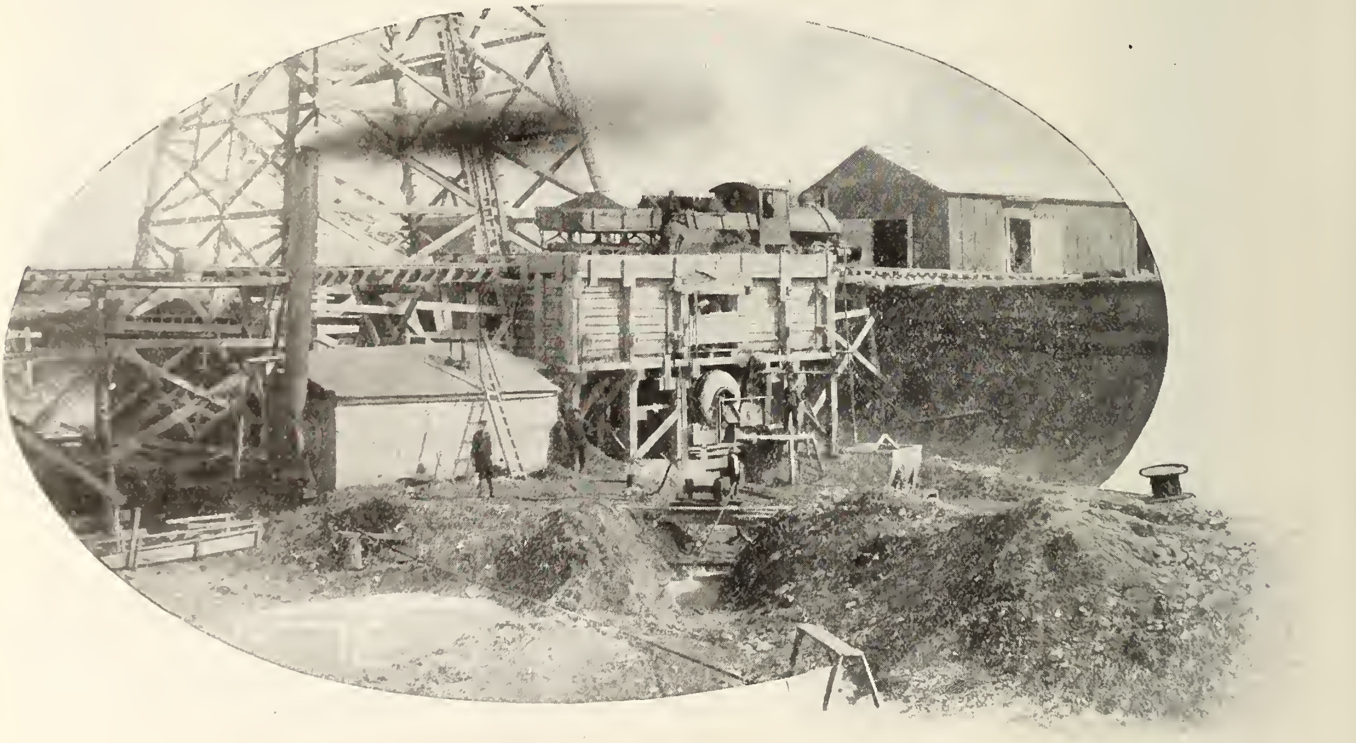

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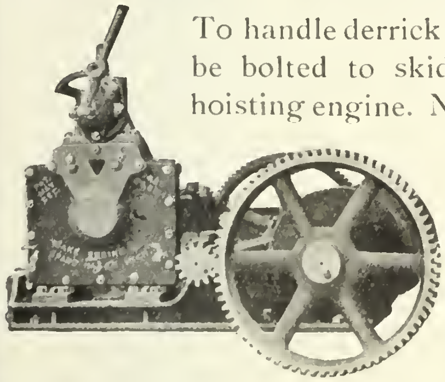

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Norfolk House, LAURENCE POUNTNEY HILL, LONDON, E.C.

J. HARVEY
CONTRACTOR
Greenesville - - Ont.
Driller of Oil, Gas, Salt or Artesian Wells
Deep Wells a Specialty
20 YEARS' EXPERIENCE IN CANADIAN OIL FIELD

Contracts taken in any part of Canada. Several years experience in Artesian Wells for Municipal Water Works. Estimates or geological information cheerfully furnished.
References Given

THE FOUNDATION COMPANY

LIMITED

Bank of Ottawa Building - Montreal, Canada

RECENT CONTRACT

We make a Specialty of

Water Power Construction, Power Plants, Dams

OUR SCOPE:

BRIDGE PIERS — DOCKS — DAMS — SEA-WALLS — MINING SHAFTS — WHARVES
TUNNELS — WATER POWER CONSTRUCTION — HEAVY BUILDING FOUNDATIONS

OUR METHODS:

PNEUMATIC CAISSONS - OPEN CAISSONS - WOODEN AND STEEL SHEET PILING
CONCRETE PILES - WOODEN PILES - COFFER DAMS
CONCRETE STEEL CONSTRUCTION

We Invite Inquiries in Reference to Cost and Design of Difficult Foundation Work.

Orleans Filtration Plant and Concrete Building taking about 100,000 barrels of Alsen's New Cement

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

Practical Cost Data on

Herringbone Metal Lath

The ceiling of the Power House of the Toronto General Hospital measures one hundred and twenty yards net. One hundred and twenty-two yards of **Herringbone Lath** covered it completely, waste and lap included.

This is not a record; it is a typical case. The Herringbone selvage edge is the reason.

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, Toronto
Metal Shingle and Siding Co., Manufacturers

TENTS

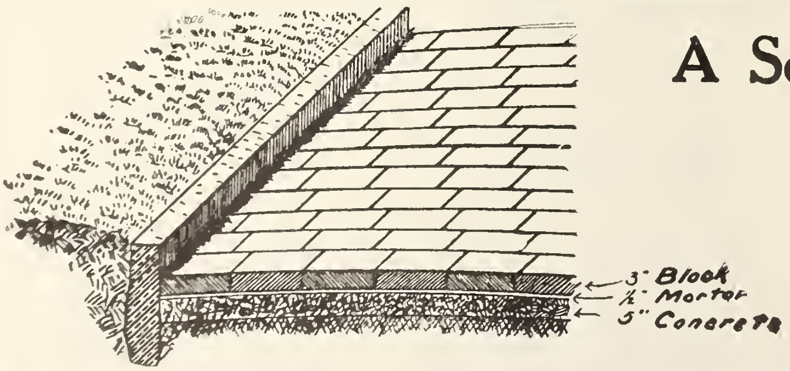
for Engineers and Contractors

We are manufacturers of a very complete line of tents for engineers' and contractors' use and can make shipment the same day as order is received.

We also make engineers' and surveyors' clothing, in fact we can fit you completely for camp and survey trips.

Send for our catalogue
It will interest you

Woods Limited
Woods Building - Ottawa, Ont.



A Scientific Pavement

must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
Send for Descriptive Literature

The Ontario Asphalt Block Company, Limited - Windsor, Ont.

Montreal Residence | "Asbestoslate" Shingles | J. A. Godin Architect

For Castle or Bungalow ---Specify this Roofing

You give to the owner a roof that is attractive one that will not warp, rust, rot, split or crack under the most rigorous roofing conditions—it is weather proof, wear proof, decay proof—and fire proof.

ASBESTOSLATE

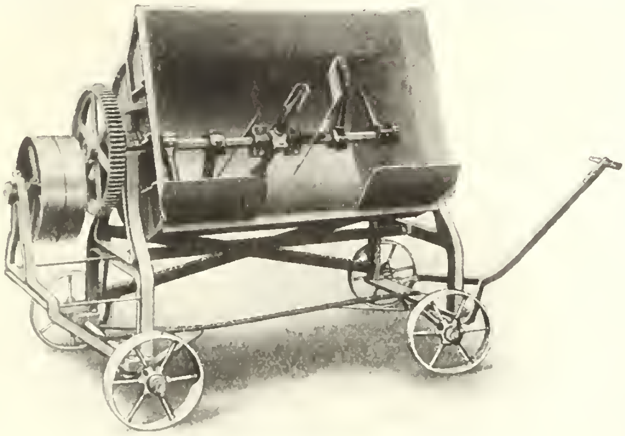
shingles are light weight—call for light framing construction—may be cut or sawed—which means a saving in labor and material—no paint—no repairs, and a low insurance rate means another saving.

You will be interested in our catalog and Booklet C R giving information on asbestos building material—write for them NOW.

The Asbestos Mfg. Co., Limited
Eastern Townships Bank Bldg.,
Montreal
Factory at LACHINE, P. Q.

Residence Montreal West | "Asbestoslate" Shingles

The Mixer With a Record



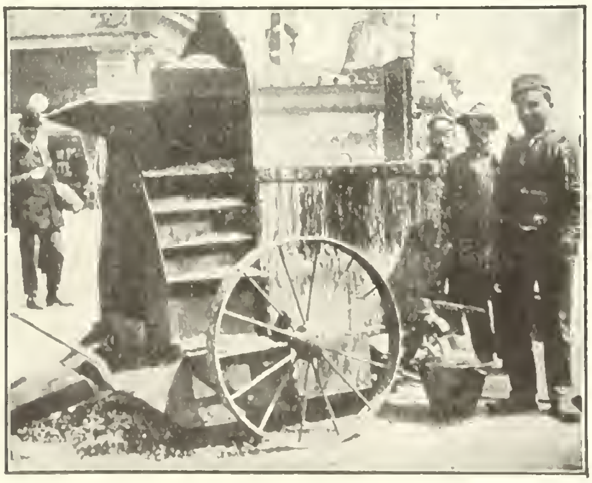
THE BLYSTONE HAND TRUCK MIXER

For combination shop and outside use this Hand Truck Mixer is acknowledged to be the very best on the market. It has been used on hundreds of sidewalks and foundation contracts with unqualified success. It is strongly built and so simple in design that it will never give any trouble with repairs.

Strongly Made—Well Balanced Easy to fill—Easy to Dump

Send for Catalogue

The Blystone Machinery Company
61 Railroad St., CAMBRIDGE SPRINGS, Pa., U.S.A.
Full line of Blystone Mixers carried in stock by
The A. R. WILLIAMS MACHINERY COMPANY, Limited
Contractors Department No. 1, TORONTO, CAN.
Sole Distributors for Canada



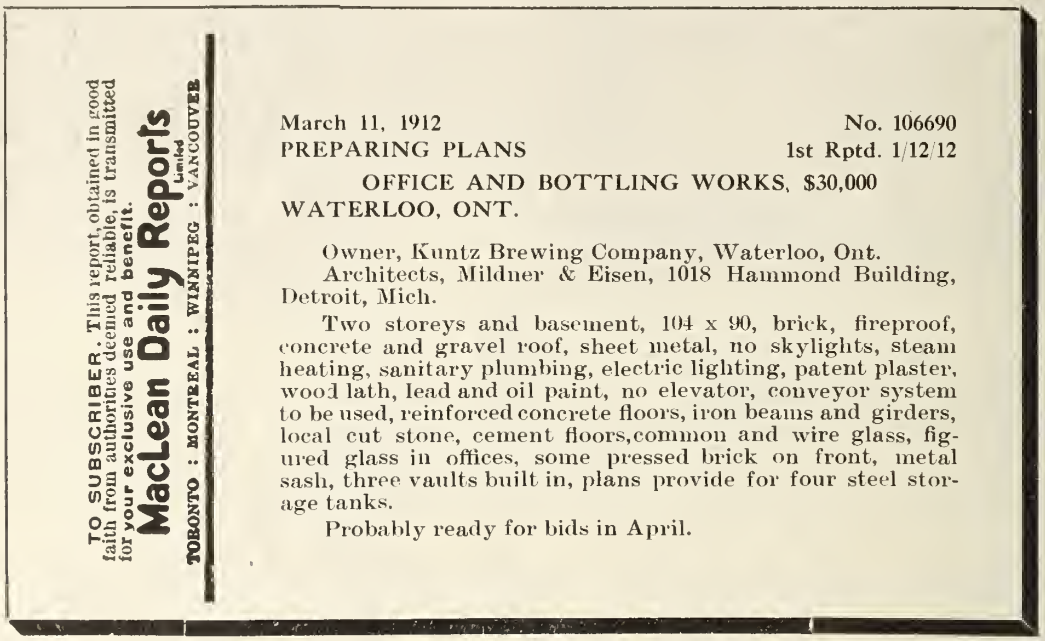
The Mullen Combination Tar Kettle and Gravel Heater

A Money Maker for Contractors

Is on wheels and can be easily moved about. Supplies hot gravel and hot tar from the one fire.

Write us for particulars

Tide Water Iron Works
HOBOKEN, N. J., U. S. A.



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MacLean Daily Reports Limited

TORONTO : MONTREAL : WINNIPEG : VANCOUVER

March 11, 1912 — No. 106690

PREPARING PLANS — 1st Rptd. 1/12/12

OFFICE AND BOTTLING WORKS, $30,000

WATERLOO, ONT.

Owner, Kuntz Brewing Company, Waterloo, Ont.

Architects, Mildner & Eisen, 1018 Hammond Building, Detroit, Mich.

Two storeys and basement, 104 x 90, brick, fireproof, concrete and gravel roof, sheet metal, no skylights, steam heating, sanitary plumbing, electric lighting, patent plaster, wood lath, lead and oil paint, no elevator, conveyor system to be used, reinforced concrete floors, iron beams and girders, local cut stone, cement floors, common and wire glass, figured glass in offices, some pressed brick on front, metal sash, three vaults built in, plans provide for four steel storage tanks.

Probably ready for bids in April.

This illustrates the form in which firms in over two hundred **different** lines receive daily advice of opportunities for their getting business. Each subscriber receives reports relating to his business only. Each project is followed from its inception to completion—supplementary reports being issued as the work progesses. You are advised not only where but when there is business worth getting after. Charges are based upon the requirements of your own business. If you desire special information on any project we guarantee to supply you with a full report as soon as available from our reporters in the district mentioned. This special service is included in your contract. If you are a contractor or sell materials, supplies, furnishings or machinery your judgment will be to confer with us. Rate cards and sample reports on application.

MACLEAN DAILY REPORTS

Limited

220 King Street West, TORONTO

Montreal **Winnipeg** **Vancouver**

Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per M
No. 1 dry pressed red brick	$18 00
No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	11 00
Wire cut bricks for foundation work	12 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

LUMBER (Building Material)

Hemlock Lumber—

2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00

Pine—

1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pine Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving..	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	

Pine trim for paint finish—

4 in. casing per 100 ft.	2 00
5 in casing per 100 ft.	2 25
8 in. pine base, per 100 ft.	3 25
10 in. pine base, per 100 ft.	4 25
1 in. pine window stool	2 75

Shingles—

XXX B. C. Clear Shingles, per M.	3 60
X. B. Extras	3 50
X. B. Clears	2 90
No. 1 pine lath, per M.	4 75
No. 2 pine lath	4 25
No. 1 spruce lath	4 00

Cedar Posts—Fence—

in. at small end, each	25
in. at small end, each	35
Hemlock lath	3 25

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 25 per cent, for approved specifications:—

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "		15.00
91 to 95 " ...		17.50
96 to 100 "		20.50
01 to 105 "		24.00
06 to 110 "		27.50

The following are wholesale prices for glass t Montreal and jobbing prices at Winnipeg for ox lots:—

MONTREAL

	Star	D.D.
5	$3.25	$4.75
0	3.45	5.20
0	3.85	6.00
0	4.10	6.50
70	4.35	7.00
80 ...	4.85	7 50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 per cent.

High grade compression work, 55 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 and 10 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.50

Square head brass cocks, 60 per cent.

Lead Pipe

Lead pipe, $7.50 net; lead waste, $9.00 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black	Size	Galvanized
¼ inch	$2.01	¼ inch	$2.86
⅜ "	2.04	⅜ "	2.86
½ "	2.72	½ "	3.57
¾ "	3.16	¾ "	4.31
1 "	4.51	1 "	6.19
1¼ "	6.19	1¼ "	8.44
1½ "	7.43	1½ "	10.13
2 "	9.90	2 "	13.50
2½ "	15.80	2½ "	21.56
3 "	20.75	3 "	28.31

Malleable fittings—Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 67½; nipples, 4 inch diameter and under, 75 and 10; nipples, 4½ inch and up, 70; malleable lipped unions, 65 and 10 per cent.

Plain steel bars, $2.05.

Square twisted bars, ¾ to 1¼, $2.15

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 65 per cent

7 and 8 inch pipe, 50 per cent

Sewer Pipes

4 in. ...	25c ft.	15 in. ...	1.35 ft
6-in.	40c ft	18 in	1.90 ft
9-in ...	65c ft	20 in ...	2.25 ft
12 in ...	1.00 ft.	21 in	3.25 ft

all less 60 per cent

CEMENT, STONE, STEEL, Etc

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.80

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.55

Crushed stone, 2 inch, $1.30, 1 inch, $1.35, [illegible] inch, $1.45

Binder stone, $1.30 per ton, f.o.b. Toronto

Burnt River rubble stone delivered, $15 to $16 per toise

Free stone delivered, $15 to $16 per toise

Brown coursing stone, delivered, $3.25 to $3.50 per yard

Grey coursing stone, delivered, $2.25 to $2.50 per yard

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding

Brown sills and heads, in the rough, delivered, 40 cents per foot

Rubble stone in car lots, $1.30 per ton

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $1.50 in car lots; hydrated lime, 9.00 in car lots

Lime, per cwt., delivered, not less than 1,500 lbs. 33 cents; white, 43 cents

Plaster of Paris, Anchor Brand, $1.50

Manilla Rope, best, per pound, 12½ cents

PAINT AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $9.00 per 100 lbs.

Boiled Linseed Oil, in barrels, 78c per gallon.

Raw Linseed Oil, in barrels, 75c per gallon.

Turpentine, in barrels, 60c per gallon.

Pure Red Lead, dry, $7 to $8 per 100 lbs.

Putty, pure linseed oil, in bulk, bbls., 3½c.

Putty, pure linseed oil, in 25 lb. tins, 4c.

McMYLER DERRICKS FOR SALE

Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turnover buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address

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1515 Rockefeller Bldg., Cleveland, O.

The
Laurentian Granite Co.
Limited
MANUFACTURERS OF
Building Granite, Granite Setts, Curbing, Crushed Granite

Samples Furnished and Prices Quoted on Application

Rose and Pink Granite Quarries at Staynerville, P. Que., Co. Argenteuil, on C.P.R.

Bank of Ottawa Bld'g.
224 St. James St.
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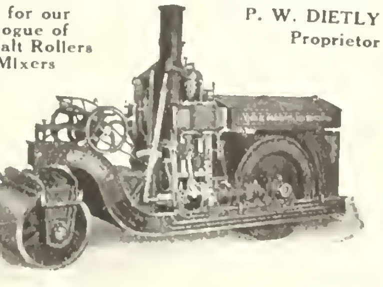
ERIE MACHINE SHOPS

Send for our Catalogue of Asphalt Rollers and Mixers

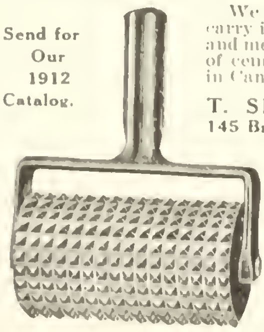
P. W. DIETLY
Proprietor



"Our 20th Century Roller"
1303 Peach Street, - Erie, Pa.

Cement Sidewalk Tools

Send for Our 1912 Catalog.



We manufacture and carry in stock the largest and most satisfactory line of cement sidewalk tools in Canada.

T. SLACK & CO.
145 Brock Ave., Toronto

Representatives

A. Brunner, Montreal. Forbes & Van Horn, Vancouver. H.S.Howland, Sons & Co., Toronto. Winnipeg Tool & Forging Co., Winnipeg. J. H. Ashdown, Ltd., Winnipeg.

Rails for Contractors, Switches, Girders, etc
New and Second Hand.

Locomotives and Cars

JOHN J. GARTSHORE
58 Front Street W., TORONTO

"EFFICIENCY
in
Structural Waterproofing

depends upon the grade of materials selected coupled with consistent

METHODS"

We are equipped to provide both

INTEGRAL METHOD—embracing the use of HYDRATITE.

MEMBRANEOUS METHOD—embracing the use of THE DEHYDATINES.

Dehydratine No. 1—A damp-proofing agent applied to inner walls—a furring substitute.

Dehydratine No. 2—A colorless material for external application on masonry.

Dehydratine No. 3.—For backing up cut stone—prevents staining of same.

Dehydratine No. 4—A foundation compound for walls, footings, etc.—renders same waterproof.

Dehydratine No. 6—A plastic material to be trowled on rough foundation surfaces against pressure.

Dehydratine Mastixement—A bituminous material used as a binder for Minerva Irish Felt.

Minerva Irish Felt—Considered by Engineers the best waterproofing medium in foundation work where pressures are to be met.

"The Dehydratines possess elasticity and durability which insure their permanence in the structure"

Hydratite—An inert substance for water-proofing concrete, stucco, etc.

Symentrex—A water-proof cement coating made in colors, for all exterior masonry surfaces and concrete floors.

Symentrin—"A near relative" to Symentrex, for interior plastered surfaces.

Bondsit—Bonds new to old concrete.

For Fifteen Years Standard of Their Kind.

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(CANADA), LIMITED

Manufacturers of the Famous British Brands of Minerva

Paints & Varnishes.

Send for Catalog and Complete Information

Toronto, Canada **London, England**

Water-proofing Agencies:—

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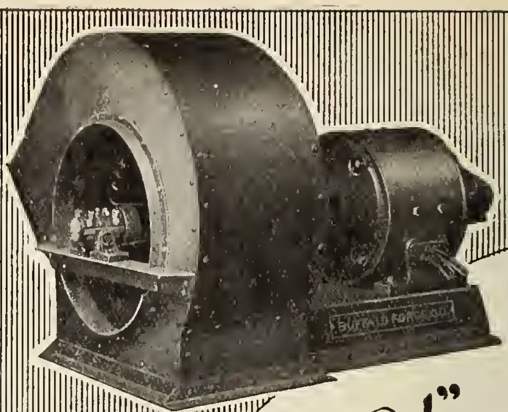
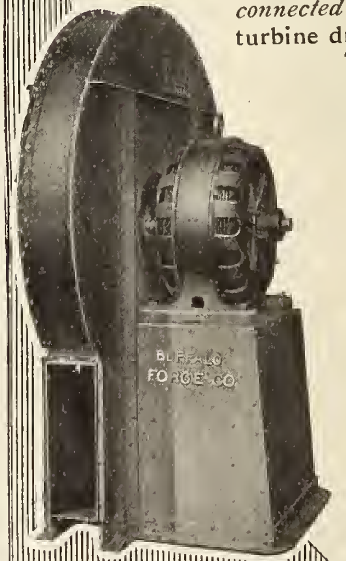
"The Minerva Emblem Stands for Reliability"



"Buffalo" Fans

For Heating, Ventilating, Drying and Exhausting.

Ask our engineers to recommend the fan best suited to your requirements. Our designs include the new high-efficiency "*Conoidal*" multiblade fan, used extensively for heating systems, mine and tunnel ventilation, and the motor-driven *Steel Plate Pressure Blower*, giving pressures up to 24 oz. Both of these designs show higher efficiency than obtained with any similar types. We specialize in *direct-connected* units (motor, engine or turbine driven) for every service. These are distinguished by absence of belt troubles and the very lowest power consumption. Whatever your problem write us.



CANADIAN BUFFALO FORGE CO., Limited

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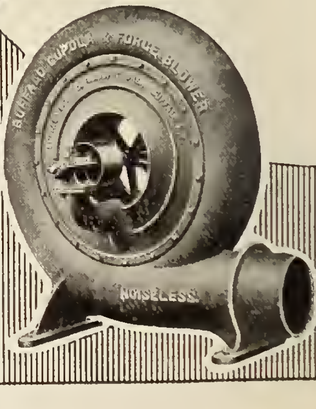

ADANAC RED CORE RUBBER COVERED WIRES AND CABLES

RUBBER COVERED WIRES AND CABLES
TRADE ADANAC MARK

Are made according to the specifications of the National Board of Fire Underwriters. The conductors are drawn from copper of the highest conductivity and are covered with two thicknesses of thoroughly vulcanized rubber compound of high quality. The wires are braided over insulation and the smooth high finish they receive makes them specially desirable for conduit work.

IMPERIAL WIRE AND CABLE COMPANY
Limited
MONTREAL

The Northern Electric and Manufacturing Co. Limited
Sales Agents

TORONTO REGINA WINNIPEG
CALGARY EDMONTON VANCOUVER

Renfrew Lime

will make more Mortar per 100 lbs. of Lime than any other kind, and will save you 75 cents a day on each bricklayer. At the end of a year your savings would pay for the lime.

The quality of "RENFREW" Lime is very superior and it will pay you to use it.

"RENFREW" the LIME of QUALITY

Jamieson Lime Company
Renfrew, Ontario
White Lime - Stone - Grey Lime - Brick - Drain Tile

"KILBOURNE & JACOBS"

Dump Cars

Our Dump Cars will give you entire satisfaction. We can supply cars in all capacities for any practical guage. Wheels are all properly chilled and the construction and material used are the best.
Our Cars are declared by steam shovel and car men to be superior to all others, both in construction and operation.

Let us have your enquiry, we would be pleased to submit full particulars and prices at any time.

"Davenport" Saddle Tank Locomotives

For Contractors and Quarry Service

Supplied in any size for any practical guage track.

"Marion" Steam Shovels

For Railroads — Contractors — Brickyards, Etc.

We supply Steam Shovels in all sizes. Can furnish both Standard and Revolving types. Write us stating your special requirements and we will be pleased to submit proposition.

F. H. Hopkins & Co.

MONTREAL

BRANCH OFFICES: General Supply Company of Canada, Ltd., Winnipeg Agents
Ritchie Contracting & Supply Company, Ltd., Vancouver Agents

Vol. 26 Toronto, November 6, 1912 No. 45

Contract Record and Engineering Review

ESTABLISHED 1886

We Manufacture Steam and Power Pumps, Condensers, Travelling Cranes, Etc

The Smart-Turner Machine Company
HAMILTON, ONTARIO LIMITED

"MADE IN CANADA"

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Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
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Air Compressors

OF BELLISS MAKE

have gained their reputation for

- Simplicity of Design
- Noiseless Running
- Compact Design
- Low Oil Consumption
- Continuous Operation
- Overall Efficiency

Messrs Belliss & Morcom, Ltd.
BIRMINGHAM, ENGLAND
Agents
Laurie & Lamb
Board of Trade Building, MONTREAL

Continuous and Machine Banded Wood Stave

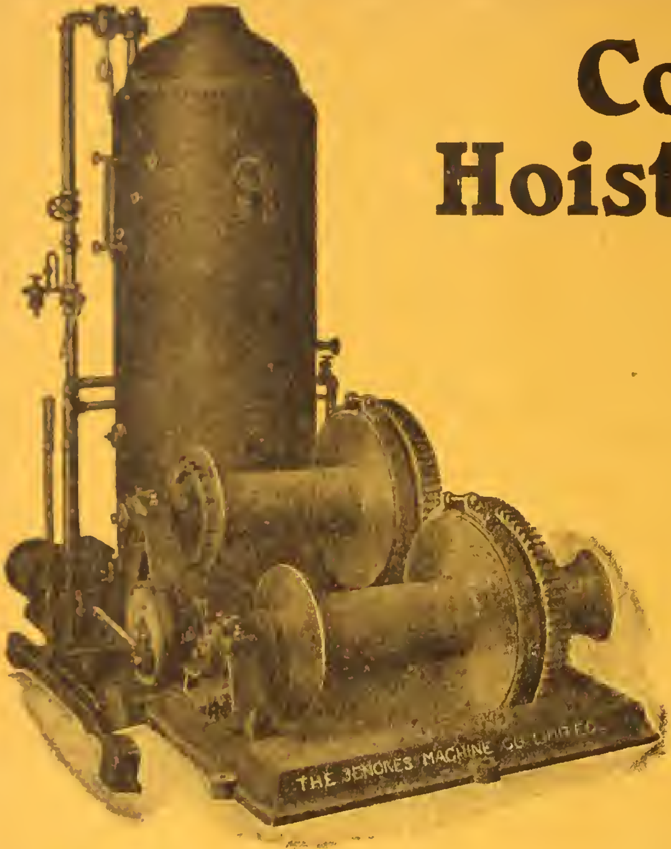
WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
P. O. Box 563 Vancouver, B. C.
Office and Factory, Granville St., near High Bridge
WRITE FOR CATALOGUE
Full Particulars and Estimates Furnished

Alphabetical Index of Advertisers, Page 16 Classified Directory to Advertisements, Page 6



Contractors' Hoisting Engines

¶ Especially designed to fully meet the peculiar requirements of Contractors' work.

¶ Great care has been taken to secure maximum strength and rigidity without unnecessary weight.

¶ Built in all the popular sizes.

¶ Full particulars and prices to interested parties on request.

The
Jenckes Machine Company
Limited

General Offices: Sherbrooke, Que. **Works: Sherbrooke, Que. - St. Catharines, Ont.**
Sales Offices:—Sherbrooke, Montreal, St. Catharines, Cobalt, So. Porcupine, Vancouver, Nelson

This is the Fastest Sand Handling Plant on "The Lakes"

It consists of an 'American' Derrick, "American" Engines, and a 1½ yd. capacity Clam Shell Bucket.

It's the Ideal Combination for the man who wants the Best Sand Handling Plant that money can buy.

Tell us what you'd like to know about handling your sand successfully and economically.

American Hoist & Derrick Company, ST. PAUL, U. S. A.

Gorman, Clancey & Grindley, Edmonton and Calgary, Alta., and Nelson, B. C.
Vancouver Machinery Depot, Ltd., Vancouver, B. C. Stuart Machinery Co., Winnipeg, Man.

Concrete is the best and cheapest material for permanent paving of city streets as well as for country roads.

$$\frac{\$1{,}000}{\$6} = 166.6 \text{ miles.}$$

The cost of keeping a mile of macadam road in good condition for one year will pay for the maintenance of 166⅔ miles of concrete road for same period.

The first concrete road was built in Bellefontaine, Ohio, nineteen years ago. The cost of maintenance has averaged **$6 per mile per year.**

Six years ago New York State started to build 12,000 miles of macadam road. Fifty million dollars was voted for the work. To date, 3,674 miles have been improved, and $49,000,000 has already been spent—or over $13,000 a mile—and the present cost of maintenance, only six years after the first mile was built, is **$1,000 per mile per year.**

Is it any wonder that the New York Road Commission, in asking for another fifty millions, has promised the people to spend it for concrete highways?

Wayne County, Michigan, has built 33 miles of concrete roads since 1909, and the farmers of Wayne County are so well satisfied that they no longer consider macadam roads.

Canada's era of road building is just beginning. Will she profit by the experience of these other commonwealths? Will she spend her road money on roads that constantly need repair—or will she build permanent roads?

The engineers of our Free Information Department will gladly supply any information on concrete highways that is desired, without cost or obligation to the enquirer.

Canada Cement Company, Limited

Head Office - Montreal

Sales Offices at

Montreal Toronto Winnipeg Calgary

RESULTS COUN

Why
Not
Use
The
Best ?

Work
With
The
Holman
Drill

On JUNE 12th, 1911, we sold the 3¼ in. Holman Drill shown above. Up to OCTOBER 1912, the TOTAL REPAIRS consisted of ONE PAWL and a roll of square Duck Packi The Drill has been in use NINE HOURS per day, during every working day in the last S TEEN MONTHS, drilling on an average NINETY FEET per shift in hard "Banc Rou

CAN YOU BEAT IT ?

You win when you use **Holman Steel Rock Drills** because your

MAINTENANCE COST IS EXCEEDINGLY SMA
FOOTAGE DRILLED IS GREATER
BLACKSMITHS' COSTS ARE LESS
FUEL COSTS ARE REDUCED

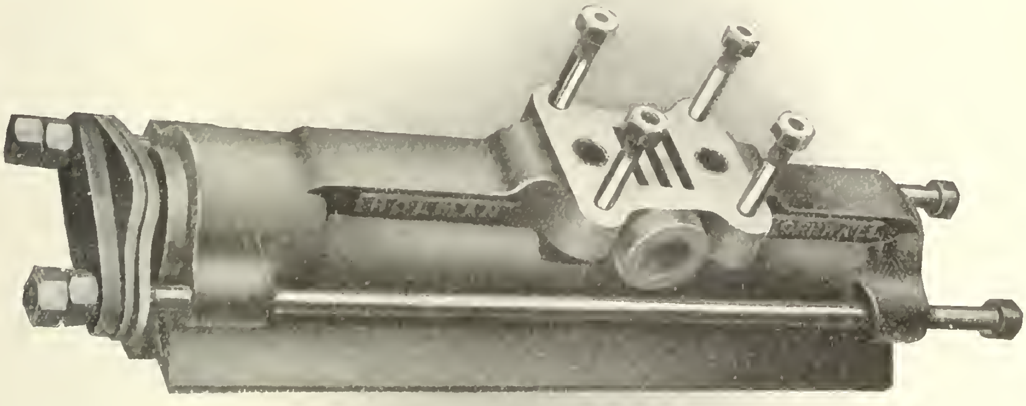
THE DRILL YOU WILL FINALLY BU

Write for Catalogue R 43

Montreal, 318 St. James St.
Toronto, 155 West Richmond St.
Cobalt, opp. Right of Way Mine.

MUSSEN

ow Many Drill Cylinders id you Scrap last year ?



The Holman Cylinder

The Drill Cylinder being an expensive part, economy demands that it should be made to stand the longest possible duty. Experience of big users has shown that the Holman Cylinder has 3 times the life of the ordinary Drill Cylinder.

Note *Ordinary Drills require New Cylinders every 6 to 9 months.*
Holman Drills require New Cylinders once in 2 to 3 years.

JUST WORK OUT THE SAVING

E DRILL YOU WILL FINALLY BUY

LIMITED

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(Continued on page 12)

Don Valley Products Combine Safety and Beauty

Bell Telephone Building, Toronto

Don Valley Porous Terra Cotta Fireproofing renders a building absolutely safe, and Don Valley Bricks have the beauty of appearance that is so necessary a factor in present day construction. A striking proof of the high estimation in which Don Valley Products are held by Canada's foremost architects is furnished by the numerous buildings in which they have been used; these buildings being, in many cases, the finest of their kind in Canada.

"SPECIFY DON VALLEY PRODUCTS"

THE DON VALLEY BRICK WORKS

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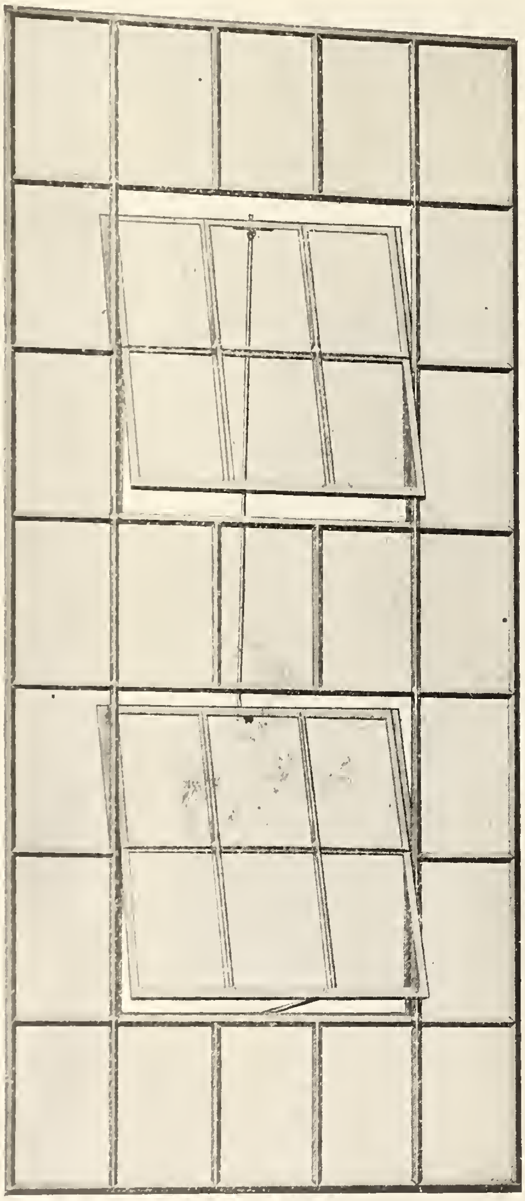
Montreal Agent: **David McGill, 83 Bleury Street**

LET IN THE LIGHT



"Fenestra"

"Fenestra"
TRADE MARK

Solid Steel Sash

will afford

More Light—Better Ventilation

in any building where they are installed. "Fenestra" is a high-grade steel patented joint sash—it takes up minimum space and permits the maximum passage of light through the window.

"Fenestra" Solid Steel Sash requires no frame, sash weights or heavy mullions—the cost is thereby reduced so that the price compares favorably with the price of wooden sash even when the price is higher it is more than compensated for by the enormous advantages gained in

Strength, Durability, Handsome Appearance,
Weather Proofness and Fire-resisting Qualities

Besides that consider the permanence of steel as compared with wood and remember that with "Fenestra" Solid Steel Sash you save all the up-keep costs entailed by wooden sash and frames—in a big building that is a big item.

"Fenestra" Solid Steel Sash

proves itself an economy wherever used but is particularly suitable for

Factories, Foundries, Power-Houses, Prisons
Railroad Shops, Warehouses, Barracks, etc.

We will help you to settle the problem of your window requirements—write us.

STEEL and RADIATION, Limited

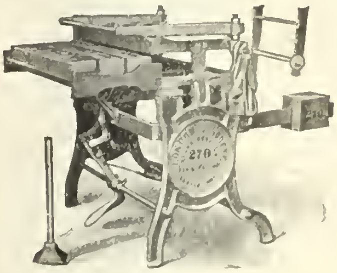
TORONTO, CANADA

Before you Buy Machinery or Equipment of any kind

write to us for our 1912 CATALOGUE. It will save you TIME and MONEY. Do you know that we are the ONLY LARGE MANUFACTURERS who specialize on

Concrete Machinery and Contractor's Equipment

The following are a few of our lines

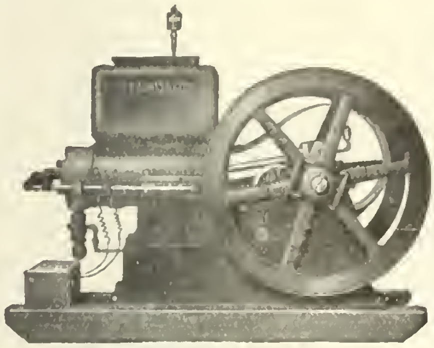

London Cement Brick Machine

London Standard Drum Batch Mixer in five sizes any kind of power or equipment.

Drum Paving Mixer with forward loader and rear discharge.

Drum Paving Mixer with side loader and rear discharge.

London Automatic Batch Mixer No. 1


Standard Gasoline Engine

Automatic Batch Mixer two sizes any kind of power.

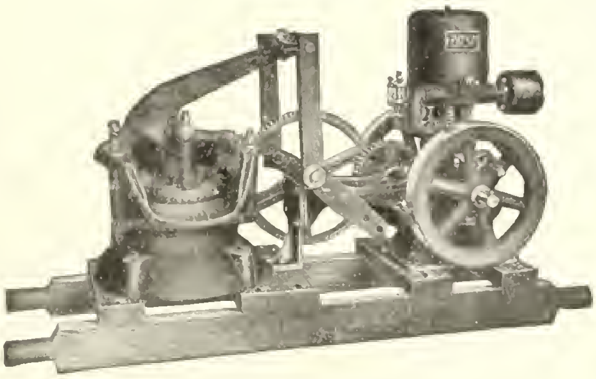
Mortar Mixers.

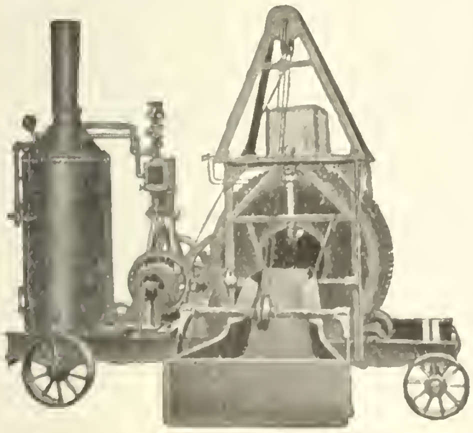
Hand Power Concrete Mixers.

Tile Moulds.

Cement Block Machines.

Cement Brick Machines.


Power Operated Diaphram Pump


London Standard Drum Batch Mixer

Cement Tile Machines.

Side Walk Tile Machines.

Sill Step and **Window Cap Moulds.**

Ornamental Moulds.

Rock Crusher.

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Mason's Sand.

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Pumping Outfit.

Gasoline Hoists.

Sidewalk Forms.

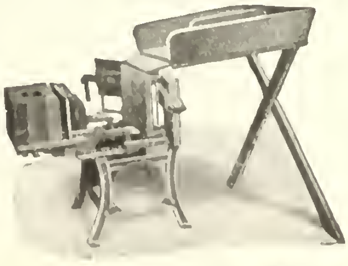
Material Elevators.

Driers both portable and stationary.

Fence Post Moulds.

Concrete Carts.

Wheelbarrows.


London Face Down Concrete Block Machine

And a Complete Line of Cement Working Tools

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

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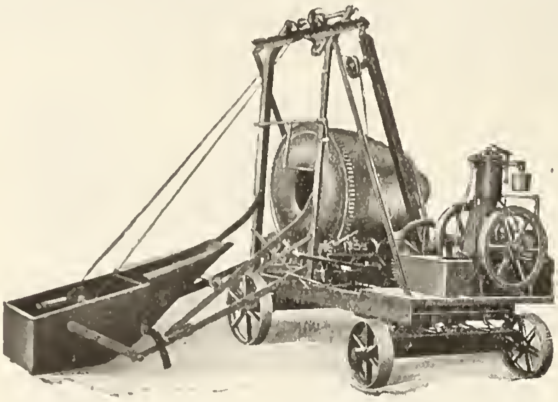
We are the Largest Manufacturers of Concrete Machinery in Canada

For Any Rush Job

You Are Forced to Admit

that

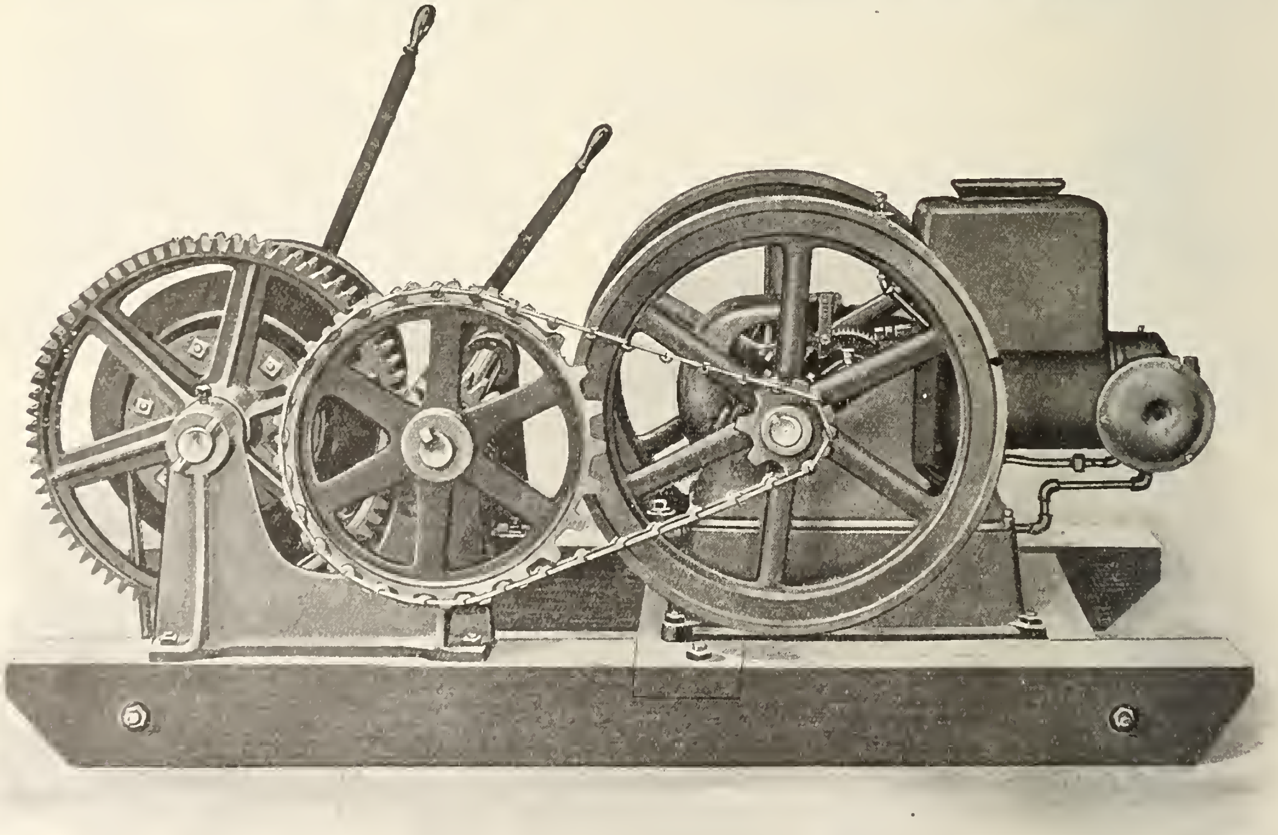
The Wettlaufer Improved Heartshape Mixer



Wettlaufer No. 1 Heartshape Mixer

will stand up to the work and see the job through with a certainty of good results that you can absolutely rely on. It will make yours a more profitable job by doing quick and perfect work with no stops for repairs.

Automatic operation—low running cost
Economical working throughout



Wettlaufer Single Drum Hoist No. 1

The most useful and complete hoist for all building and contracting purposes. Its compactness, size and general handiness give it great advantages over the ordinary large cumbersome hoist and enable it to be easily moved around from one part of the job to another. Its capacity for work and general utility are unlimited.

Let us send you particulars of our Hoists and Mixers—or come and see them. Continuous Demonstrations at

WETTLAUFER BROTHERS

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Steelcrete

The most perfect system of concrete reinforcement on the market. Expanded Metal Cold Drawn—gives maximum stiffness, strength and high elastic limit.

ROGERS

Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

All

Fire Proofing Material

used by the

Building Trade

supplied by

ALFRED ROGERS LIMITED

28 King St. W., TORONTO, Ont.

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WESTERN SALES MANAGER

WINNIPEG

Man.

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery. Send your orders for crushed stone to

ROGERS

French Caen Stone Cement

Monarque Brand and Cementaline. Rich in appearance and of unlimited durability, as good as natural stone—but cheaper. Full particulars of

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Canadian Boving Co.
Canadian Buffalo Forge Co.
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Noble, Clarence W.
Paterson Mfg. Co.

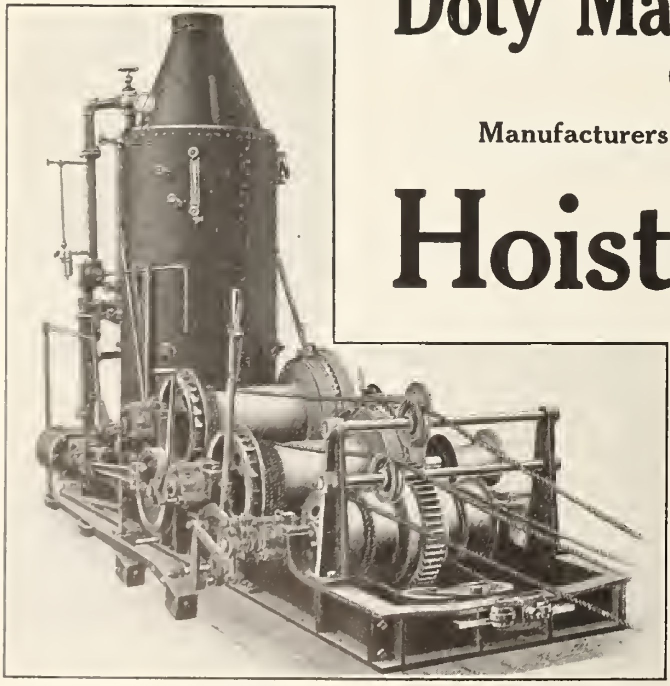
(Continued on page 14)

The

Doty Marine Engine & Boiler Company Limited

Manufacturers of **Superior**

Hoisting Engines



This cut illustrated our Standard Double Cylinder Double Drum Hoisting Engine with Derrick Swinger attached. "Superior to any other on the market." All parts constructed, guages and templates and every engine tested under steam.

Derrick Swingers, Material Elevators, etc.

for

Contractors, Mines and Quarrymen

A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

Works—GODERICH, ONT.

To buy our Engines is a Guarantee of Satisfaction

Sawyer Belt will stand any weather

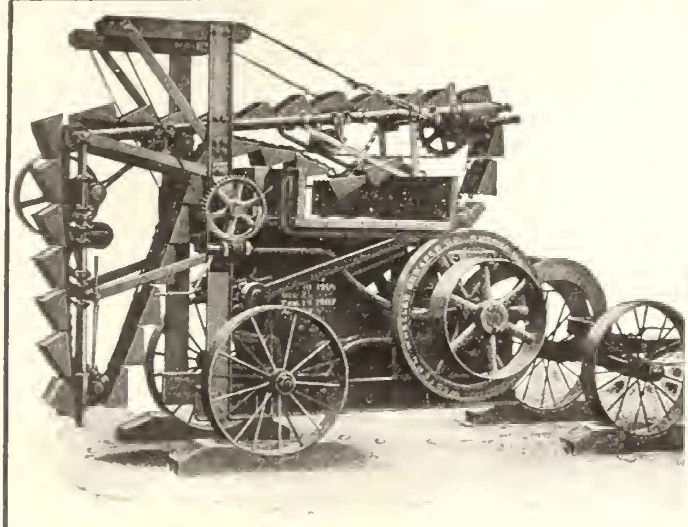
Exposure is the cause of many belting troubles. Neither leather or rubber belting, though expensive will stand both rain and shine.

Here is where **Sawyer Canvas Stitched Belt** shows its superiority. The compound in which it is immersed renders it pliable under all conditions.

It costs less—It wears more.

Try it in rain or shine

Sawyer Belting Co.
Cleveland, Ohio



Steel Castings and No Lost Motion

forged steel yoke, cross bars on yoke remove all strains from main frame, moving jaw given a compound oscillating and reciprocating motion so that crushing is **continuous**, are features of the

Aurora Steel Rock Crusher

Its compact form combines great strength with light weight, making it very portable, and **specially adapted for contractors' use.** Strongest and most durable crusher on the market combining maximum product with minimum power. Adjustable to various sized stone. *Get our Special Crusher Catalog*

WESTERN WHEELED SCRAPER CO.
Earth and Stone Handling Machinery. **Aurora, Ill.**

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS				
	1903	$ 0.00	1908	$ 93.26
	1904	3.30	1909	200.46
	1905	9.35	1910	14.07
	1906	37.33	1911	2.29
	1907	16.11		

Total $376.17 or 5⅔c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.
Hagersville, Ont. **Limited**

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York Sand and Gravel Co.

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Dominion Sewer Pipe Co.
Gartshore Thomson Pipe Co.
National Iron Works
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Mun. Engineering & Contracting Company

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Montreal Locomotive Works
Mussens Limited
Thew Automatic Shovel Co.
Willis Shaw Mach. Co.

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Lundy Shovel & Tool Co.

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Pinchin, Johnson & Co.

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Sheldons Limited
Sturtevant Co., B. F.

Steam Turbines
McDougall Caledonian Iron Wks.

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Sackville Freestone Co.
Sand & Supplies
Smyth & Ryan

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Dominion Bridge Co.
Factory Products
Dominion Steel Castings Co.
Hamilton Bridge Works Co.
Mackinnon Holmes & Co.
McNeil & Co., W. P.
Phoenix Bridge & Iron Works
Provincial Steel Company
Reid & Brown
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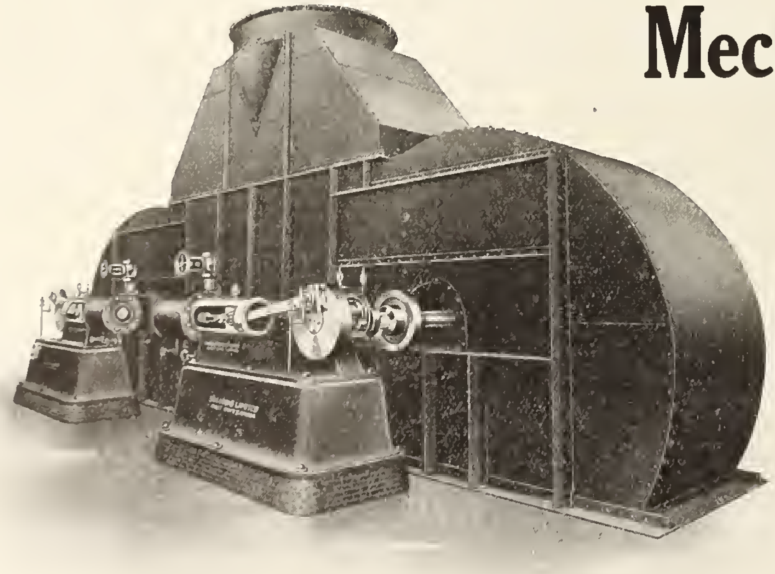

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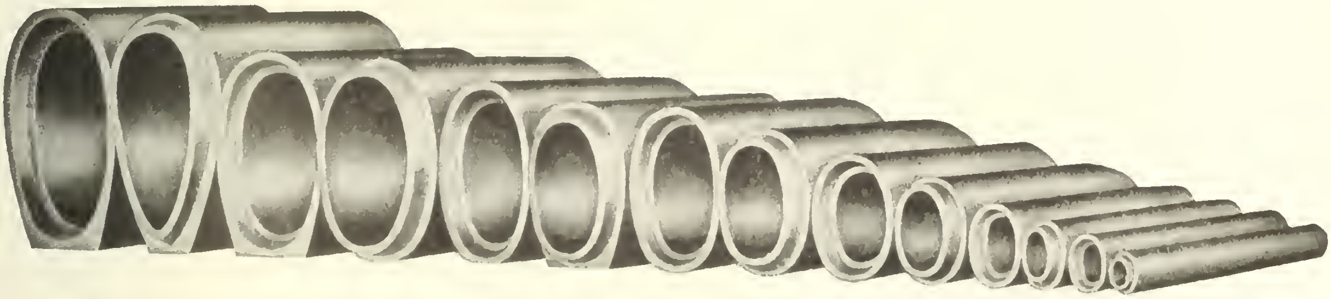

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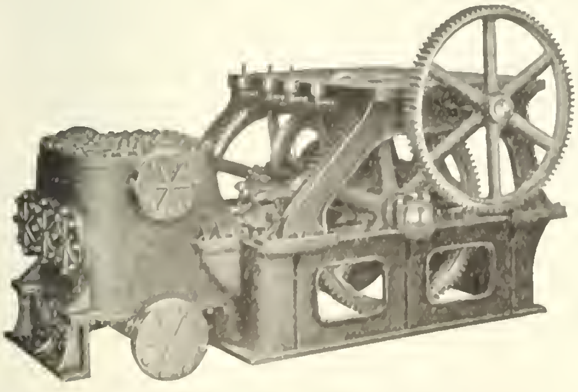

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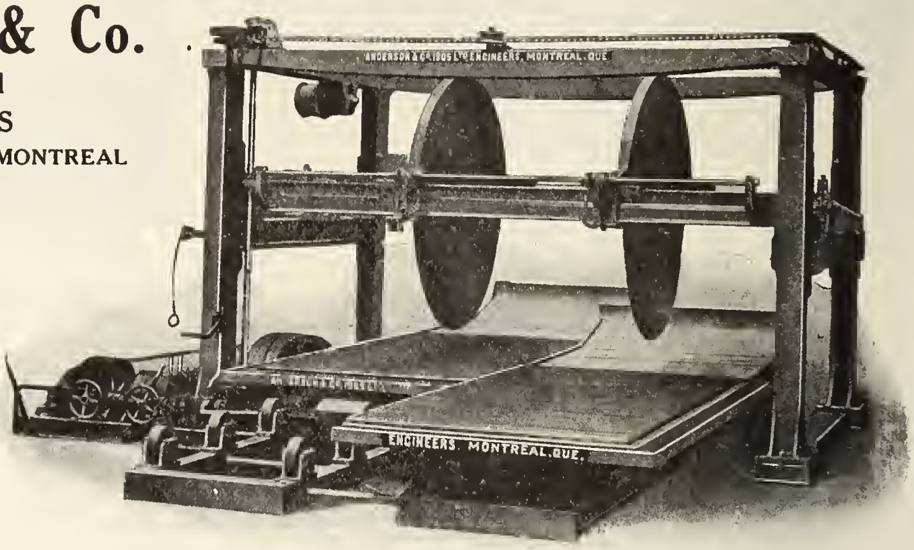

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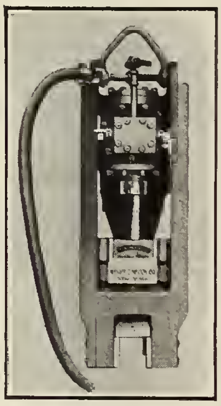

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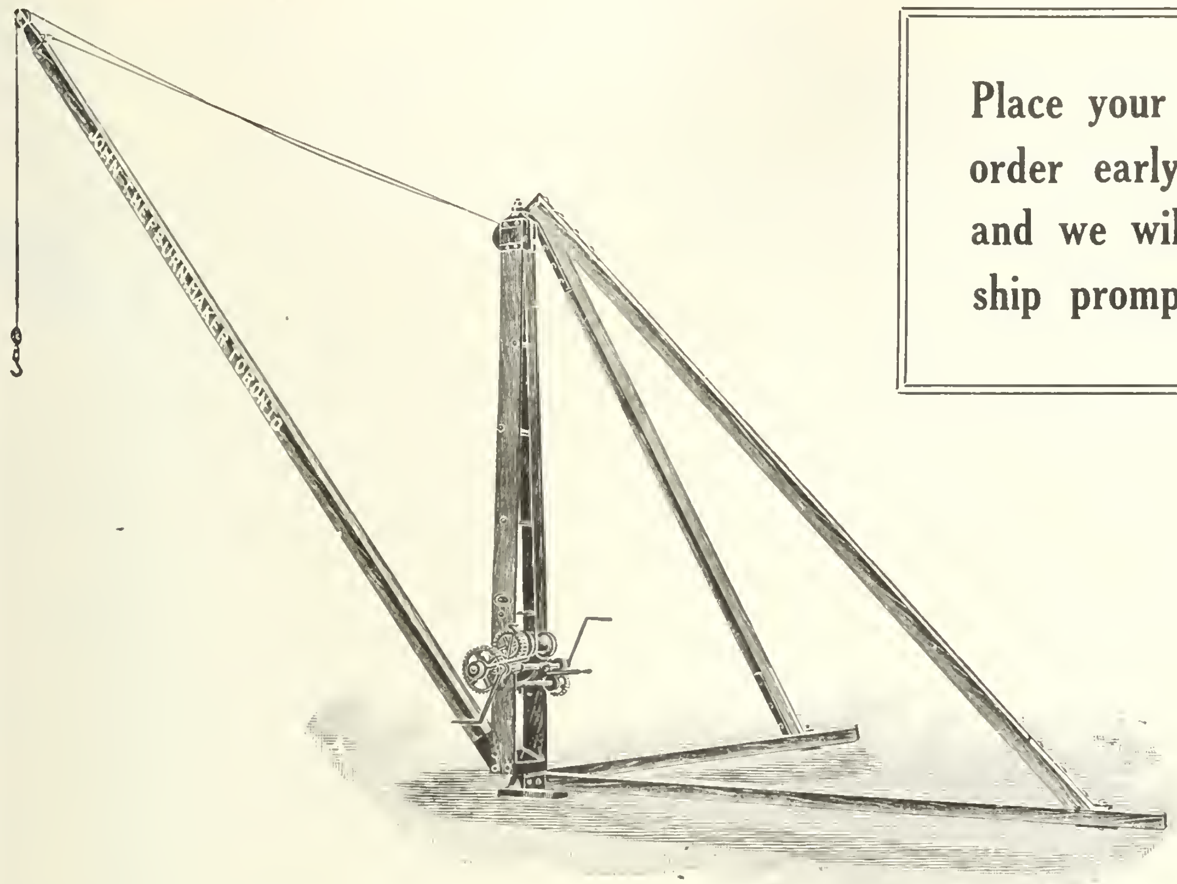
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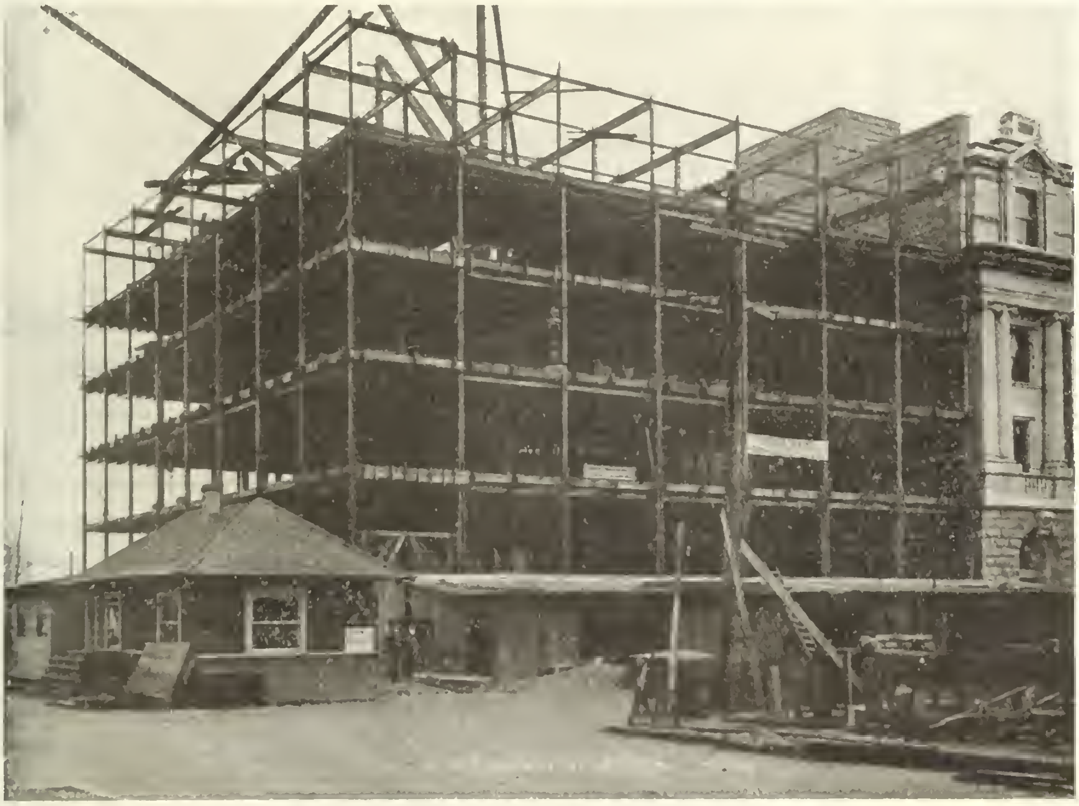

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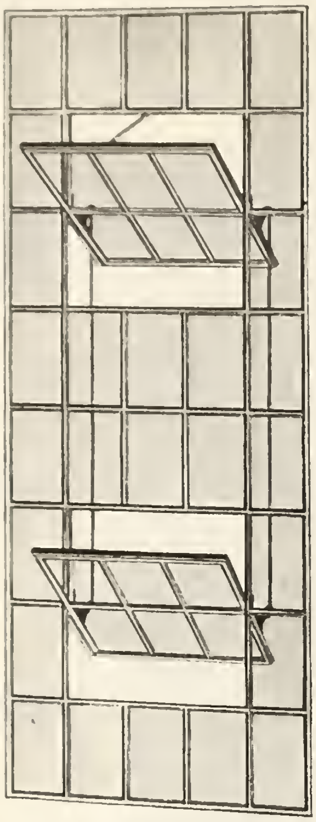

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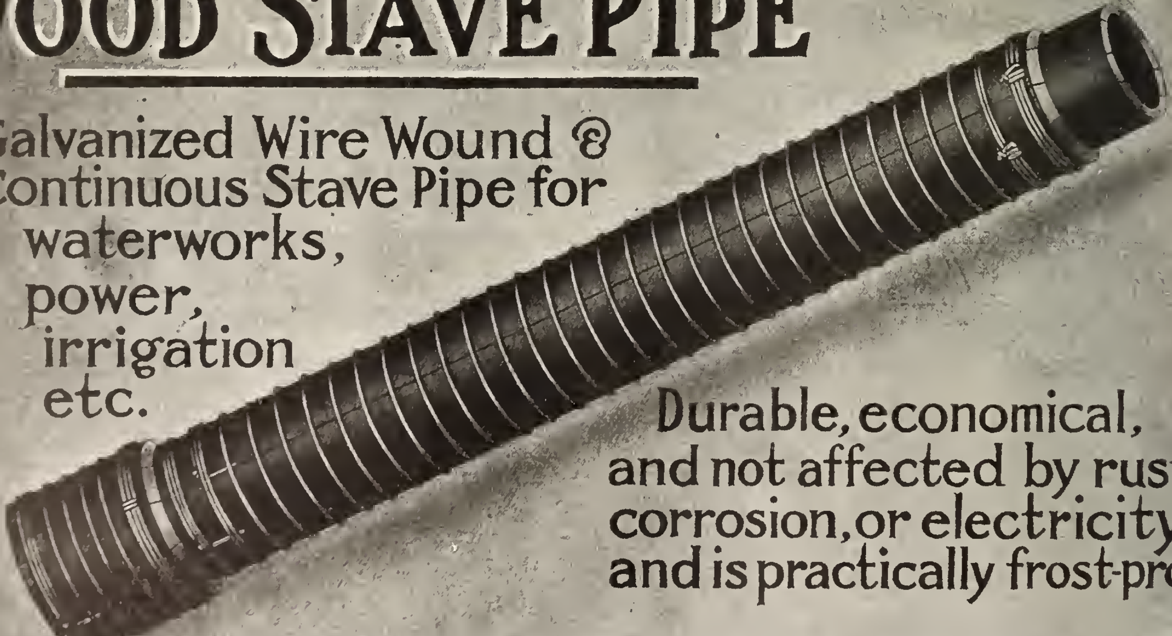

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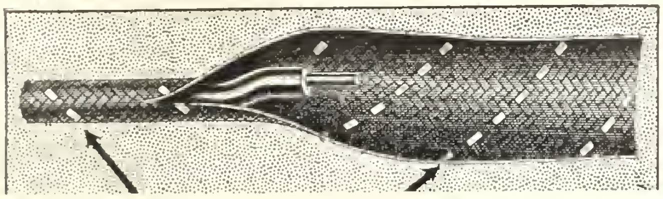

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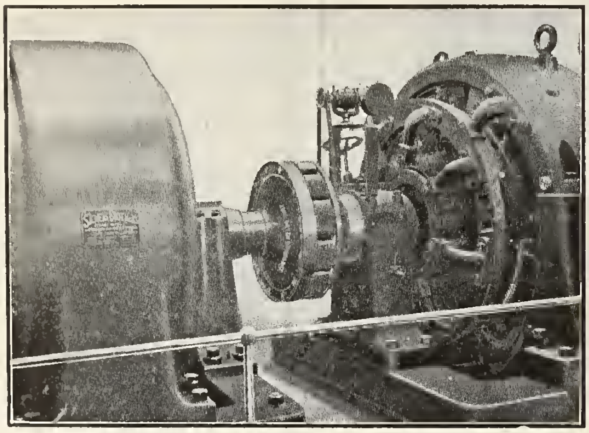

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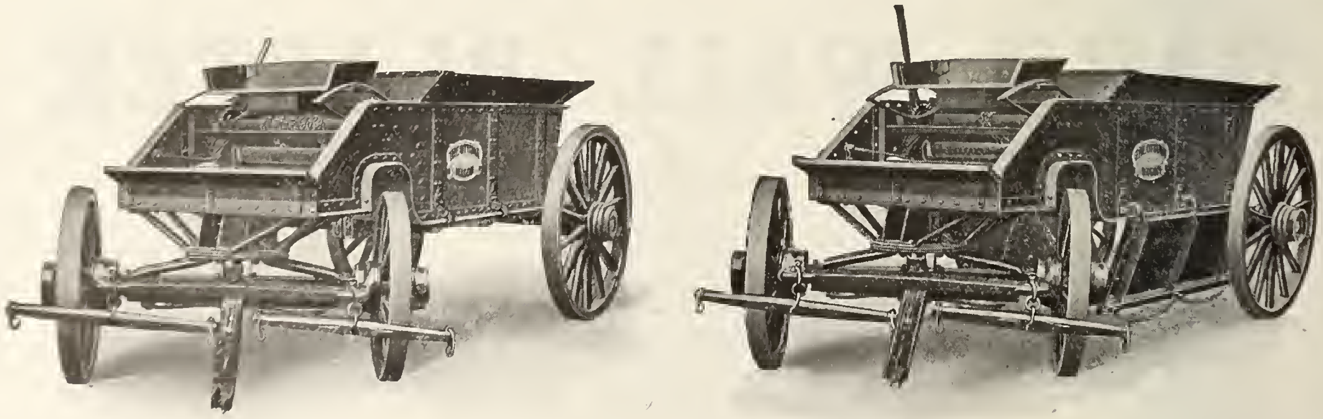

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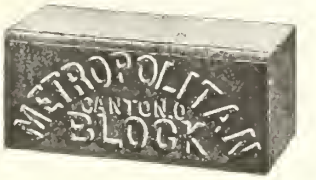

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for Highest Efficiency, Absolute Reliability, Greatest Economy

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Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.

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Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

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4000 Pairs 20 lb. Fishplates.
750 " 60 " Angle Bars.
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ROUNDS and SQUARES	FLATS	ANGLES
3/8 to 2-in.	3/4 x 1/8 to 4 x 1	3/4 x 1/8 to 2 1/2 x 1/2

Cold Twisted Squares for Concrete Re-inforcing made from New Steel Billets only.

The Steel Company of Canada
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Plain Rounds and Squares

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Bands and Flats all Sizes

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ANGLES from ¾ x ¾ in. up to 2 x 2 ins. **ROUNDS and SQUARE** from ⅜ in. up to 1¼ ins. **FLATS** from ¾ in. up to 4 ins. in width, and other special sections.

We can ship from stock

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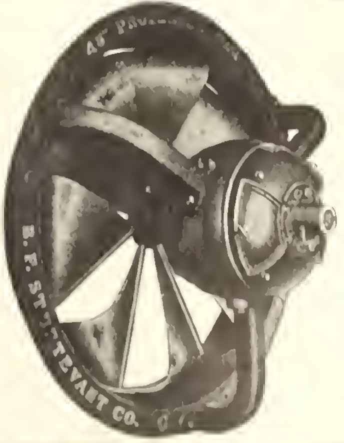

The design of our Propeller Fans is along the same scientific lines as all our fan product, and that is why Sturtevant Propeller Fans deliver more air for the same size fan and with less power expenditure than any other propeller type made. The construction is particularly strong and durable.

They will quickly change the air in factories, workrooms, kitchens, billiard halls, etc., carrying away the smoke, fumes, hot air, keeping the atmosphere sweet and cool.

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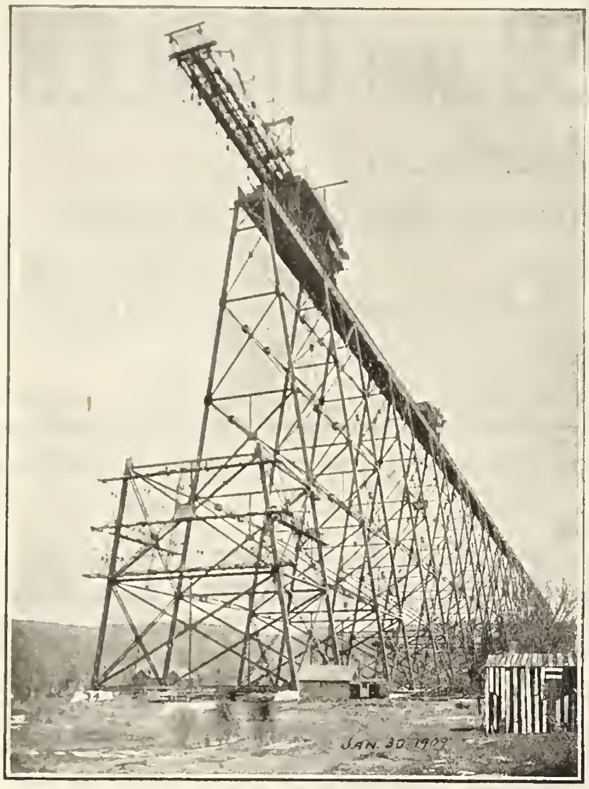

Outlook Bridge on the C. P. R. built by the Canadian Bridge Company who in common with the other large bridge builders have found Beatty Hoists thoroughly reliable for this trying service.

"Beatty Hoists"

STEAM and ELECTRIC

Have stood the test of time and given satisfaction wherever they have been placed.

Ask the man who has one.

We have shipped Engines into almost every part of the Dominion and will gladly put you in touch with our nearest customer.

Can furnish any size or type and give prompt shipment.

We also build Dredges, Steel Scows, Centrifugal Pumps, Derricks, Derrick Irons, etc., and are sole Canadian makers of the **Williams "Faivrette" Clamshell Buckets.**

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The cold working process of manufacturing "STEELCRETE" increases its elastic limit 100%, ranging from 55,000 to 65,000 lbs. per sq. inch. The value of a high elastic limit in steel mesh is recognized to be of most vital importance by those who specify steel mesh for concrete reinforcement.

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Write for full particulars and let us send the "STEELCRETE" Booklet

Munderloh & Co., Limited

MONTREAL

A Belt Which Conveys ALL the Power

Practical men know the drainage of power from a slipping belt, ***and because they know,*** they are buying

GOODYEAR RUBBER BELTING

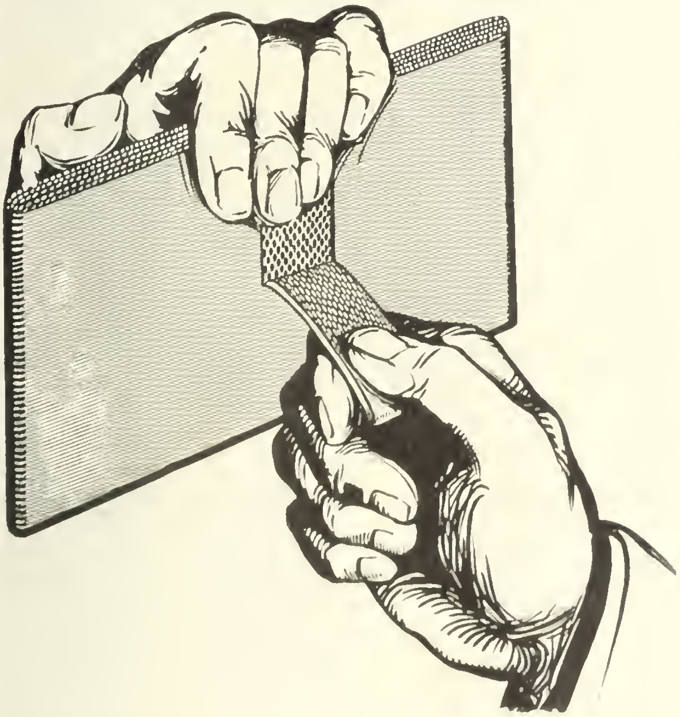
Which Neither Slips Nor Stretches

It is built up, layer upon layer, of close-woven, long-fibre, cotton fabric, rubberized and cured under Goodyear processes. And every Goodyear belt has in it the lowest possible minimum of stretch, because the belt is "cured" whilst stretched to the limit of safety in a special machine.

That is the Goodyear Method of Belt Manufacture

And the result is entirely satisfactory to belt users—a fact to which our enormously increased sales testify. What is the significance of this CONTINUED SALES INCREASE—50% over last year? Simply that Goodyear Belting more than fulfills the claims made for it by the Goodyear people—who know what a belt should do, and make a belt to do it.

It has cost us less than $200.00 for claims or adjustment of every kind in connection with our total output for the past two years—a remarkable tribute to Goodyear reliability.



Look into the Belt for Yourself—Try to Tear it Apart.

Make a cut in the top layer—and then try to pull it apart. You will get a faint idea of its strength.

That is the result of forcing rubber at a tremendous pressure through the fine cotton fabric—separating every strand—thus abolishing all internal friction or grinding. Whilst these layers of fabric are afterwards so compressed as to be almost homogeneous, the finished belt bends easily, the "duck" being so woven as to retain complete pliability in the finished belt.

For Main Drives and High Speed Pulleys GOODYEAR Belting is the Best

It has all the tensile strength necessary to absorb tremendous strain without slip, stretch or rent. The grip of rubber and the prodigious strength of hard-twist cotton fabric are united, and prove equal to every emergency.

Where the power transmitted is high, and great tensile strength is essential, Goodyear Rubber Belting proves its worth.

EVERY GOODYEAR BELT IS SUBJECTED TO A STRINGENT TEST BEFORE LEAVING THE FACTORY, and what is more, the materials used in the manufacture are also tested in the Goodyear laboratory before using.

IF YOU USE A BELT AT ALL IT WILL PAY YOU TO USE A GOODYEAR

Loss of power is loss of profit and an inferior belt is dropping power all the time. Goodyear belting quickly earns its cost in power saved and trouble avoided.

TWO HUNDRED AND FORTY ROLLS A TOTAL OF 72,000 FEET

We have just received an order for this quantity of GOODYEAR RUBBER BELTING from one business concern in the west, for the equipment of interior elevators. Such an order shows supreme confidence in the quality of GOODYEAR Belting.

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In the choosing of belt our booklet would be of great assistance to you. We supply it free. Write to our nearest branch for one.

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Factory, Bowmanville, Canada

BRANCHES: Victoria, B.C. Vancouver, B.C Calgary, Alta. Regina, Sask. Winnipeg, Man. London, Ont.
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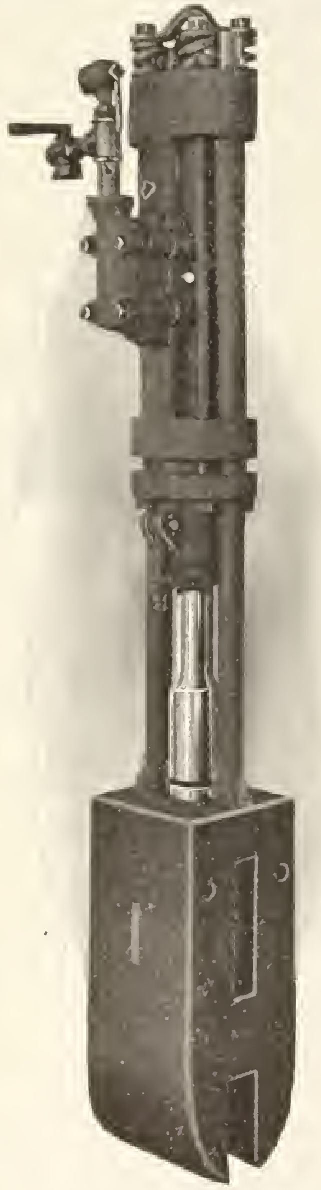
Concentrating Energy



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STEAM OR AIR

Simple
Reliable
Efficient
Economical

Ordinarily the blow impact of the piston creates a vibration which consumes a great deal of the energy of the blow. The heavy footpiece on this machine concentrates the force, thus insuring the maximum amount of work from each blow.

It is incessant, light hammering that drives a sheet pile without injury.—A great many comparatively light blows which tend to literally push the pile in, is the correct way.

They can be driven deeper and faster by this means.

This machine is almost indispensable in the following classes of work, where caving material is encountered.

Shaft Sinking
Sewage and Trench Work
Sinking Coffer Dams
Foundations
Piers
Abutments
Dock and Wharf Work
Excavations

Some Interesting Data—

Length of Machine 88 in. Footpiece 11 in. x 11 in.
Drives Piles up to 25 feet in length.
Strikes 300 blows per minute.
Boiler required to drive by steam, 15 H. P.
Free air per minute when driven by compressed air—170 Cubic Feet.

This should not be a question of which method but of which machine.

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COMMERCIAL UNION BLDG. - MONTREAL, CAN.
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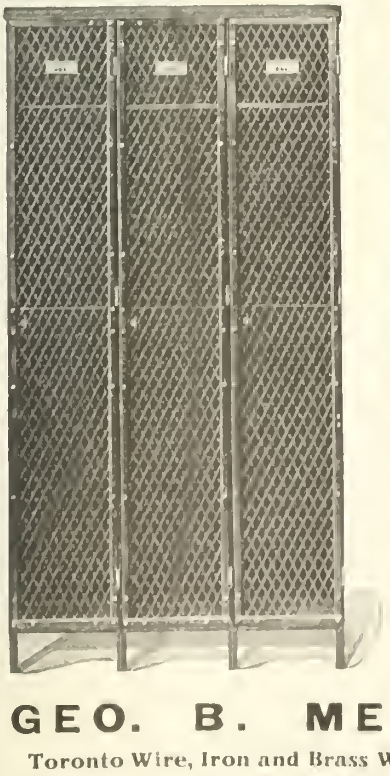

from the old style wooden lockers and use **Meadows' Metal Lockers.** Their construction is rigid and embodies a number of original features not found in other makes worthy of your consideration.

Send for our interesting booklet entitled

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Catalogue No. 38.

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Limited

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WINNIPEG Travellers Bldg
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Height 250 ft. Top diameter inside 10 ft. built for Wayagamack Pulp & Paper Co'y, Three Rivers, Que.

Montreal Harbor Commissioners, Elevator No. 2
John S. Metcalfe Co, Limited
Engineers and Contractors
Reinforced Concrete Construction treated with
"Medusa" Waterproofing

Here is Irrefutable Evidence that

"MEDUSA" WATERPROOFING

is the recognized constituent for the completion and perfection of all reinforced concrete construction.

In the case of Grain Elevator No. 2, which is one of the largest reinforced concrete elevators in the world,

"Medusa" Waterproofing

was used throughout the entire construction. About 20,000 pounds altogether was necessary to complete this colossal work.

"Medusa" Waterproofing is specially useful in making building blocks, cement plastering, roofing tile, cellar walls, system and reservoir linings, etc., etc. and anywhere where resistance to percolation of water is required.

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THE STANDARD

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Automatic Individual Bowl Syphon Action Range Closet

The most perfect range closet ever produced.

Write for our Booklet "E"

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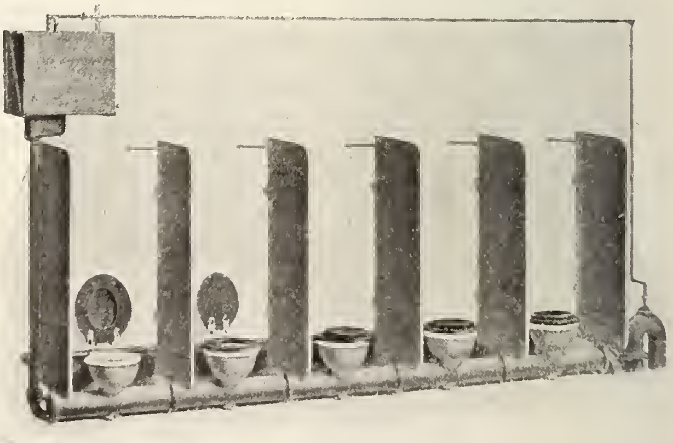

Plate F. 517

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Contract Record and Engineering Review

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Alphabetical Index of Advertisers Page 16

Vol. 26 November 6, 1912 No. 45

Changes that Cost Millions

WE are not high minded; we have no proud looks; and so we find some gratification in the letters published elsewhere in this issue complimenting us upon our stand for fair play on behalf of the municipal engineer. We have said much upon this score. We shall doubtless have the opportunity (alas!) to say more. As it is, much remains to be said.

The writer of one of the letters brings forward the reminder that "within the present year some eight or ten men of long experience and high standing . . . have been compelled to throw up their jobs in disgust," while "others, at a great disadvantage, have fought their way out single-handed." It is timely, with the close of the year approaching and, in cases, a change of officials in prospect, to consider the effect of changing city engineers.

There are, of course, cases where the city engineer is not competent to hold his position, in which the city has outgrown his abilities, although these had been ample for a village. In these cases a change is justifiable, and no questions of personal consideration for the engineer as an individual should cause the incoming administration to retain him at the expense of the community at large. But unless such be the case, the community cannot but be the loser by a change in city engineers.

It was reported in one of the leading journals of the United States some months ago that instances were not lacking where city engineers over there, feeling themselves aggrieved at removal, had taken with them from the office the notebooks in which had been recorded most of the records of their work during previous years. From what we know of the profession in Canada this sort of thing would not be practised, for the engineer holds his reputation too dearly to take such a mean disadvantage with a view to "getting even;" but while he would leave the official material he could not be expected to part with the private memoranda and data that he had compiled personally for his own future guidance. The permanent loss entailed by the absence of these personal notes is not generally appreciated. And there are not only the personal but the mental notes and items of information, both general and detailed, which it is impossible for the engineer to leave behind, however good his intentions. No better instance of this can be cited than the case of Mr. Rust, who resigned early this year to become city engineer of Victoria, after spending some thirty-five years in the engineering department of the city of Toronto. Mr. Rust, of all men, would leave his house in order and help his successor to the best of his ability, but he had an experience in the work, a knowledge of the city, a realization of its needs and a mass of information concerning all conditions affecting the work of his department, which it was impossible to pass on to his successor—and yet the latter would have to acquire it before he became equally useful. Where the city retains the services of a man for a number of years and then parts with his services, it is losing—generally either by its own bad judgment in the first place or by subsequent bungling—that for which it has paid, and a portion of the salary of the new appointee must be regarded as given to pay for that experience which the former incumbent took with him. This, of course, is assuming that the greater engineering ability of the new man does not counterbalance the lack of local knowledge.

Under the supervision of the city engineers of the Dominion millions of dollars are expended annually. If the frequent changes that have taken place within 1912 have meant a loss in economy and efficiency of only 5 per cent., and placing the municipal expenditure of the country at, say, forty million dollars, we have a loss of two million dollars. We are quite sure that the figure is an inordinately low one, but in any case it is too much to pay for aldermanic bungling.

Business Conditions and the Supply Market

AT this season of the year, as a rule, there is a decided slackening tendency in the building and allied trades. The present year, however, is proving an exception and in every line of business in the constructional field there is marked activity. The principal factor in the situation is the unprecedently large amount of development work of all kinds, the second is the shortage of materials and the difficulty experienced in obtaining efficient freight transportation, which has interfered seriously with the expeditious prosecution of many large undertakings.

It seems that some relief is being found in the car situation on account of the termination of this season's harvesting operations, but it will take the railway companies a considerable time to clear off the orders for cars which they now have on hand. In a few weeks, or sooner if cold weather sets in, the demand for coal will cause rush orders for cars, and this is not unlikely to mean a further shortage of cars for shipping general merchandise. At the same time it is probable that many manufacturers and others, profiting by their experience last year when some of them were compelled to close up their factories through not being able to obtain coal, are holding large stocks on hand. The high prices at present obtaining for coal may also have induced many to stock up in advance.

Manufacturers report that the sale of all building materials is still very brisk and there does not seem much prospect of any appreciable decline in prices.

All classes of brick are in heavy demand, and builders and contractors are eagerly buying up any odd lots which may be in the market.

A considerable increase has taken place lately in the cost of iron pipe which has brought the price back to what dealers consider normal. The demand for all classes of heating and radiation is considered responsible for this. A further rise does not seem unlikely.

Lumber for building purposes finds a particularly keen market. Hemlock, especially, is very scarce and difficult to obtain in desirable lots. The supply of this lumber is scarcer now than for some time past and manufacturers have very little, if any, to dispose of. Some builders are substituting spruce for hemlock and, on account of the waste in hemlock which does not occur in spruce and the fact that a thinner size of spruce than hemlock can be utilized with the same result, find that they are saving money by so doing.

Prospects for the building trade next spring are very bright, there being plenty of work, which can not be completed this winter, to start on.

Valuable Report on Building Stones

A report, The Building and Ornamental Stones of Canada, by Wm. A. Parks, B.A., Ph.D., has been issued by the Department of Mines. The report is the first of a series, which will be continued annually. Part 1 of the report contains useful information relative to the quarrying, testing and handling of stone, while part 2 contains a systematic description of the various building and ornamental stones occuring in that part of the province of Ontario which lies south of the Ottawa and French rivers. The report, which contains nearly 400 pages, is profusely illustrated with diagrams and excellent half-tones. The reproductions illustrating the coloring and marking of some of the stones are particularly fine. The publication of this report comes at a most opportune time and it cannot fail to be of great value not only to the particular industry to which it relates but to the constructional interests at large.

Lime production in the United States in 1911 amounted to 3,392,915 short tons, a little more than half of which was used in structural material, according to a recent bulletin of the U. S. Geological Survey. The principal uses in the structural field were lime mortars, Portland cement mortars, concrete, gypsum plasters and whitewash. There was a slight decrease in the total production as compared to 1910, which is partly attributed to the inactivity of small kilns operated by farmers for local agricultural service and partly to the tendency toward the concentration of plants into fewer and larger units. The average price in 1911 was $4.03 per ton, compared with $4.02 in 1910. The supply is considered to be practically inexhaustible.

LETTERS

Fair Play for Municipal Engineers

Woodstock, Oct. 30, 1912.

Editor Contract Record:—

I wish to express my appreciation of the many excellent articles in the interests of the engineering profession appearing from time to time in your journal. The editorial, "The Engineer as a Public Speaker," published on page 44 of your issue of October 23, is one that merits the attention of the rising generation of engineers and of those who are aspiring to enter the profession.

What I wish to commend most particularly, however, is the stand you have taken for fair play and the decent treatment of municipal engineers. Within the present year some eight or ten men of long experience and high standing as municipal engineers have been bulldozed and browbeaten until in most cases they have been compelled to throw up their jobs in disgust. Others, at a great disadvantage, have fought their way out single handed. And this state of affairs has been brought about by men who know little or nothing of the daily problems of the average municipal engineer. No engineer would call himself infallible or object to reasonable criticism, but being criticised is altogether different from being made a common scapegoat, or—as is too frequently the case—a football for the diversion of civic politicians.

Your policy of giving publicity to such cases should meet with the approval of the whole engineering profession.

Yours very truly,

F. J. URE, City Engineer.

Higher Authority Needed

Editor Contract Record:—

I must congratulate you upon the satisfactory and able manner in which you have dealt with the experience of some of the leading engineers in the country during the last year. Your suggestion that the Canadian Society of Civil Engineers should investigate these cases has much to commend it. It has been urged in opposition that the remedy does not lie with the society but with the city council. Undoubtedly there is some truth in this, but with city councils, as in the case of certain forms of malignant disease, the remedies have to be administered. It can hardly be expected that they will be taken voluntarily. Under the present form of municipal government in Canada the engineer undoubtedly stands in need of some controlling force—higher up. The majority of engineers appear to agree on this principle, but it will require some combination to obtain the desired end.

Yours faithfully,

CITY ENGINEER.

LIFE

"The lyf so short, the craft so long to lerne"
The tools so crude, the Master-hand so stern.
The price so great, the gain so nearly naught—
The efforts vain, or knowledge dearly bought.
A broken tool—and naught wherewith to mend
A struggle brief, and then we reach—the End.
—Paul Lorrilliere.

The Trail Bridge Over the Columbia River

Unique Type of Lift Bridge Affording a Solution to an Interesting Problem of Design and Construction

FOR many years the only crossing afforded for highway traffic over the Columbia River, adjacent to Trail, B.C., in Ymir District, was by means of a ferry. This ferry was of the well known cable type, operated by the current of the river. With the rapid development of the contiguous territory, the increase of population and of travel, it became necessary to provide a better crossing than that afforded by the ferry, and the government of British Columbia provided funds and arranged for the construction of a bridge.

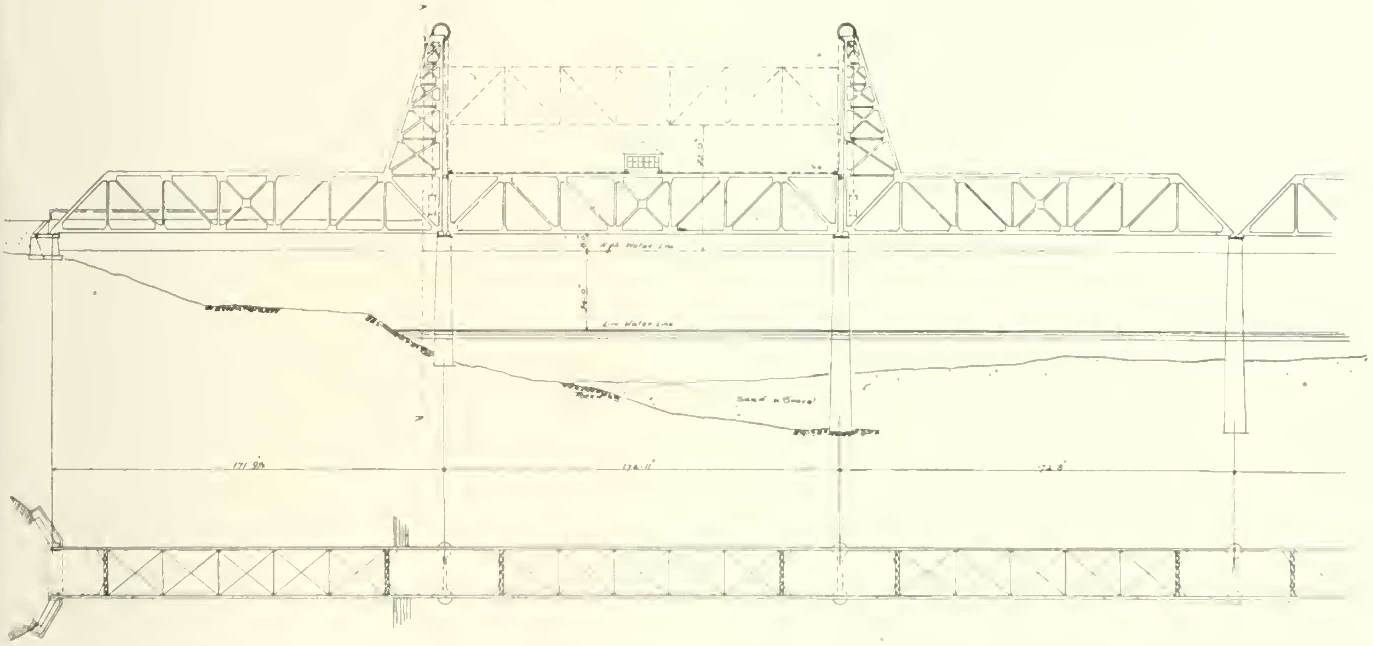
The river at the site is of navigable depth, but at the present time there is no great amount of river traffic, so that it was considered unnecessary to provide a structure having a movable span. It is certain, however, that, with the increase of river traffic, channel openings for boats at all stages of the river will be necessary.

Construction adequate to the needs of the present, and yet so adaptable as to be modified with reasonable expense and without unreasonable waste to fit future conditions, capable of providing for trans river travel, was the problem presented. This problem was solved by the use of a Waddell & Harrington vertical lift bridge. The structure is noteworthy principally as illustrating an engineering solution of unusual conditions presented.

The present construction cost practically no more than an ordinary fixed bridge, and yet it can be converted to a movable bridge at comparatively small expense, and without the destruction or waste of any part now built. The final cost of the bridge, when made movable for river traffic, will be much less than the cost of a bridge including a rotating swing span.

The bridge as built consists of four duplicate through truss rivetted spans, providing a planked roadway eighteen feet wide between guards, carried on timber joists. The spans rest on three cylindrical piers and on two abutments.

Each pier consists of two steel cylinders, 6 feet in diameter at top and 9 feet at bottom, filled with concrete. Each pair of cylinders forming a pier are jointed together by a concrete web, 2 feet thick, encased in steel, and reaching from about low water to high water. The piers are thus very rigid. The south abutment rests on exposed bed rock and was built in the open. The southernmost pier was built in a cofferdam, and the other piers by the pneumatic process. The variation of low to high water is great and the current swift, but construction was carried forward rapidly and without mishap. The abutments were of usual concrete construction, offering no extraordinary difficulties.

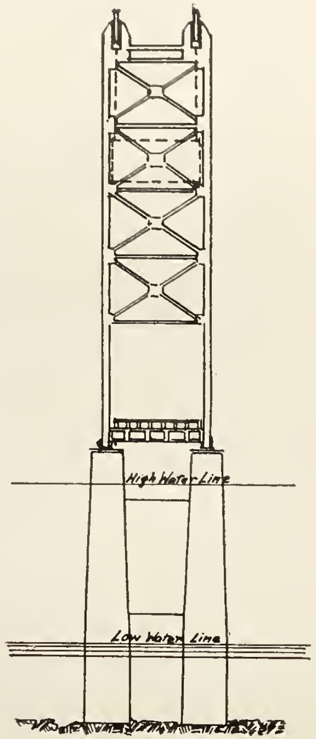


Plan and elevation of bridge, showing lift span. Towers to be installed when required

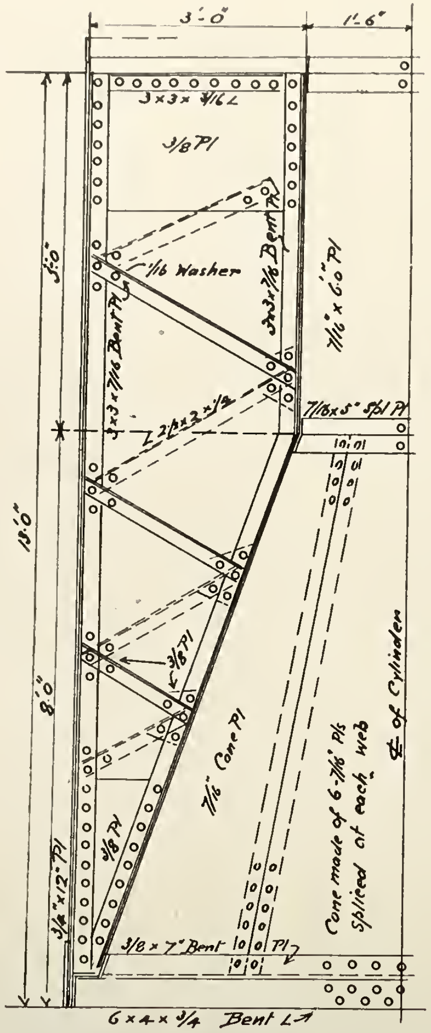
The design and details of the steel work of the spans are such as to provide simple compact connections. The flanges of all truss members are turned in making simple arrangement of gusset plates, and present a neat compact finished appearance in the completed structure.

The specifications were somewhat more thorough than are usually required for a highway span. The material is of medium steel and the shop work was of the best. Rivet holes were sub punched and reamed with parts assembled. The trusses were assembled at shop and all field-holes reamed. Rigid double plane portals are provided at each end. The steel work was painted with three coats of paint. The timber in joists, floor and hand rail was of best quality Mountain fir, well bolted and fastened in place.

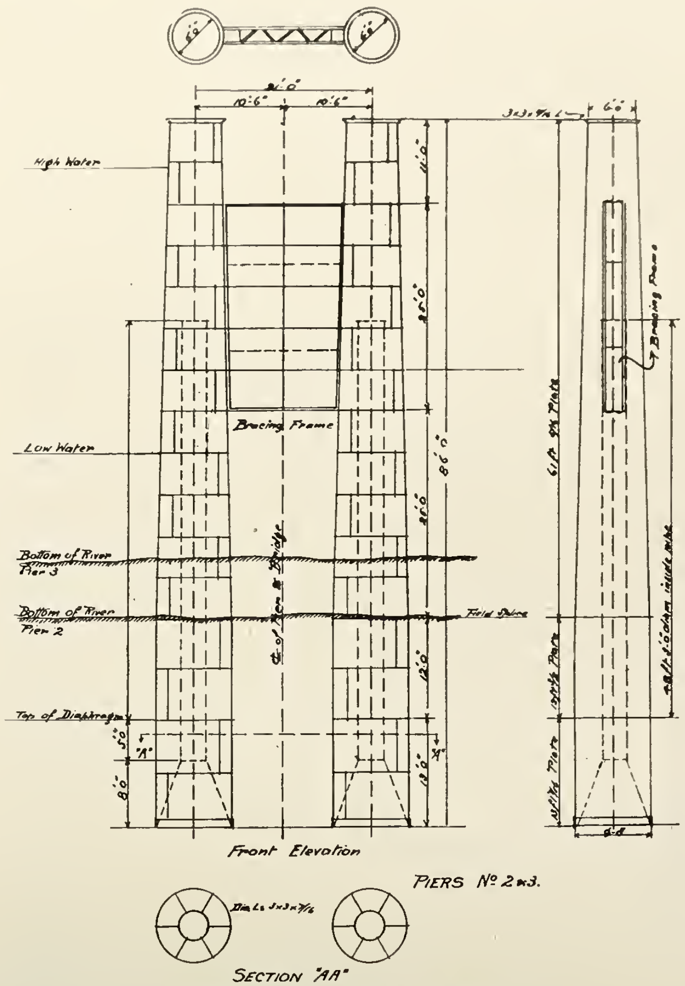
The structure, therefore, as it stands, commends



Section AA, showing proposed lift tower



Bottom of pier showing web



Elevation and section of piers

itself as an excellent highway bridge, designed and built with all the care to detail customary on large structures but so often lacking in smaller bridges. While built to carry only highway loading, no detail of material or workmanship has been slighted.

At any time this structure can be converted to a movable bridge by constructing towers at the ends of two spans, placing certain extra parts and machinery on the intermediate span, and arranging for it to be lifted and lowered at will, to a height sufficient for the passage of boats. Each tower consists of two columns braced together which will rest on the end shoe pins, and which are braced back to the fixed spans. The load of the lifting span thus comes only on the front columns, and practically no additional load is placed on the adjacent truss by the connection of the back leg. There will then be placed on the lifting span a cross girder at each end connecting to hangers rivetted between the gusset plates at the end floor beams. Steel cables for balancing the weight of the span are attached to these lifting girders, are led over sheaves at the tops of the towers and attached to counterweights of the concrete and steel. Machinery and a machinery house will be placed on the top of the movable span.

The counterweights will be built in elevated position, the machinery connected and the span be ready to operate. It is thus evident that the entire operation of making a span movable can be carried out without stopping traffic on the bridge.

The operating machinery, which will be carried on the top of the lifting span at the center, consists of four spirally grooved drums placed on centre lines of chords, actuated through trains of gears by an electric motor. Each drum controls two operating ropes: one from the top of the drum leads over a sheave at the corner of the span, thence downward, and is fastened near the bottom of the tower, and one from the bottom of the drum leads over the sheave at the corner of the span, thence upward, and is fastened at the top of the tower. All four drums are similarly connected so that when they are revolved in one direction the ropes leading to the tops of the towers are wound on, and those connected to the bottom of the towers are paid off, thus raising the span by the lifting force exerted on the corner sheaves. Reversal of direction of revolution of the drums lowers the span. A solenoid brake with limit switch controls the movement of the span and a hand brake is also provided. The span may be operated by hand if desired. The machinery is thus very simple in character, is all in view in the operator's house, and consists principally of spur gears and the two shafts extending across the span connecting the operating drums. The four corners of the span are thus held definitely by the operating ropes at all times, holding the span perfectly level. The operating ropes are provided at their extreme ends with suitable turnbuckle adjustments so that they can be kept taut at all times.

At one end the lifting span is held in position during motion by suitable roller guides engaging on tracks on the tower columns, maintaining a position both laterally and longitudinally, and at the opposite end of the span the guides maintain only a lateral position, so allowing for the expansion and contraction of the span.

As the spans are duplicates, the lifting machinery can be placed on any one of them and either of the central spans made operative, or if desired, the end spans can be made operative by providing some small additional pedestals for the rear columns of the tower at the shore end.

This type of construction requires for the movable span piers of no greater size than are used for the simple spans. A single wide channel is provided, and as no draw protection or other constructions in the river are required, boats can pass through at any angle. The span need be lifted only high enough to clear the vessel passing, and can, therefore, be operated with dispatch.

The completed bridge

The expense of building and maintaining a draw protection in a stream of this character is very considerable, and the danger of vessels striking the swinging span, which does not move from its horizontal position without a draw protection, is very considerable where swift current is encountered.

The complete plans for towers and machinery and all attachments necessary are prepared and are on file, including specifications for the construction of the new work. It will be, therefore, a very simple mat-

The bridge site

Constructional view, showing falsework

ter at any time desired to provide for the requirements of navigation.

The bridge is owned by the province of British Columbia, and was designed under the direction of Mr. J. E. Griffith, Public Works Engineer. The construction was under the supervision of Mr. Griffith's assistants, Messrs. Ford, Anderson and Broderick. The Cleveland Bridge and Engineering Company of Darlington, England, manufactured the superstructure and Messrs. Armstrong, Morrison & Company, of Vancouver, constructed the substructure and erected the superstructure. The design, plans and specifications were furnished by Messrs. Waddell & Harrington of Kansas City. The last-named firm controls patents on this type of movable bridge.

Mechanical Handling Equipment for Railroad Supply Yards

THE use of derricks and other mechanical appliances for handling material in railroad maintenance-of-way supply yards has been investigated by a committee of the American Railway Bridge & Building Association during the past year. On the basis of 46 replies received from circulars sent to a number of railroads a report was made to the convention in which it is stated that 15 of the roads in question use no derricks of any description; 6 roads handle all material through the store department, shipping directly to the work; 7 roads use no derricks except steam wreckers on heavy material; 8 roads use steam derricks of standard market types operating under their own power; 6 roads use derricks built by company forces; 1 road uses an electric travelling crane; 2 roads use stationary derricks, similar to stone derricks, having booms which will reach one track on each side; 1 road uses a stiff-leg derrick for heavy material.

Derricks and other appliances for this service are considered in two classes, one for regular supply-yard work and the other for general work, including road service. Bridge derricks can be used to advantage when not on the road, but since they are often not available when needed for yard work, they do not fill the requirements for the latter work. The committee confines itself in its further consideration of derricks to those assigned to yards only.

The advantages of a derrick car, and the kind of car best suited for any particular work, depend primarily upon the amount and kind of material to be handled. Where only a few cars of material are handled annually, it is not advisable to go to much expense to install equipment unless the proportion of heavy material is large, in which case a stationary stiff-leg derrick may be used. As the amount of material becomes greater, the advantages of a derrick increase rapidly. Derricks of some type may be used with economy in a large number of yards where they are not used to-day.

A derrick with four or five men will handle as much material as three times that number of men without such assistance, and in less time. Labor is becoming scarcer and more expensive each year. The use of proper equipment will not only reduce the number of men required but will lighten their work and enable the foreman to secure better men for the money expended. In handling heavy materials by hand the risk of injury to men is great, and this risk will increase as the foreign labor becomes more generally employed in material yards.

Another important advantage with the use of derrick cars is the greater speed in unloading material. This permits releasing cars more promptly, which is important in times of car shortage. The accumulation of demurrage charges is to be avoided where lumber, cement, iron pipe, etc., come in foreign cars. This time element is of special importance in loading large quantities of material needed for construction work, or in emergencies such as washouts and wrecks. In such times, every hour saved is very important and proper facilities for handling material will expedite work greatly.

The type of derrick to be used is largely a matter of individual choice, depending upon the kind of material to be handled. Where there are very large quantities, a travelling electric crane may be advisable. For yards of lesser importance, self-propelled steam derricks with booms of sufficient length to unload material from the car in advance on the same track, and to pole materials for some distance on either side, may be advisable. A self-propelled car can spot cars where wanted and then unload the material without requiring the attention of a switch engine, the latter usually resulting in more or less delay and being very expensive. Where a yard is not of sufficient importance, home-made derricks may be constructed of material on hand. Derricks similar to the stone derrick with booms 30 to 40 ft. long are recommended where much heavy material is to be handled.

Where stationary derricks are used, tramways should be built at right angles with the track to enable men to distribute lighter material out of reach of the derrick, leaving the space within reach for the storage of heavier material.

It is estimated that the cost of handling heavy timber, iron and concrete pipe, etc., can be reduced 50 per cent. by the use of proper equipment. Lighter material can also be handled at a saving of 10 to 25 per cent.

Proposed Manufacturing Terminal for Montreal

A syndicate has been formed in Montreal for the purpose of constructing a manufacturing terminal on a piece of land, about sixteen acres in area, lying between Notre Dame street east and the river front in Longue Pointe ward. The property has a deep water frontage of 1,200 feet. A Federal charter has been applied for by the syndicate, which is to be known as Manufacturers' Terminal, Limited, and will have an authorized capital of seven million dollars.

The scheme is to first of all construct four buildings, each four to five hundred feet in length by one hundred and fifty feet wide, and six storeys in height, with double track spurs running into each building unit, and thus through the Harbor Commissioners' Railway, connecting with every trunk line railway in the Dominion, and with suitable dock and piers for the accommodation of a number of ocean-going vessels. Each building will contain a total area of about 400,000 square feet, or a total in the four buildings of 1,600,000 square feet, or, say, thirty-seven acres of floor space. Floor strength and all handling equipment will be designed to meet the requirements of heavy products. These spaces, including heat and elevator service, will be let at rates which will be less than it would cost the individual manufacturer were he to own his own property. The buildings will be absolutely fireproof and of the most modern design and construction.

Cutting Street Pavements for Sub-Surface Mains

At the present time the pavements that are considered standard are constructed of stone, wood, brick, or the bituminous materials; under this last head are included sheet asphalt, asphalt block and bithulithic. The problem of determining which of these materials is the proper one for paving a city's streets was discussed at the recent American Road Congress at Atlantic City, N.J., by Mr. George W. Tillson, consulting engineer, borough of Brooklyn, New York City. He described, first, the characteristics of the various pavements, their adaptability to particular conditions and the care required for their proper maintenance. In connection with the maintenance of pavements Mr. Tillson presented statistics showing the extent of the damage due to openings for sewer, gas and water pipe. In the borough of Brooklyn in 1911 the Bureau of Highways laid sufficient pavement over openings and trenches that had been made in the streets to pave a roadway 30 ft. wide and 7 miles long in pavements out of guarantee alone, and when it is known that there are from 3,000,000 to 4,000,000 sq. yd. of pavement in the borough under guarantee an idea of the magnitude of this work can be obtained. These facts, Mr. Tillson said, are not peculiar to Brooklyn and it is undoubtedly true that a proportionate amount of street openings has been made in other cities.

In New York the Board of Estimate and Apportionment will not order a street paved until water, gas and sewer mains have been laid, and in Brooklyn, when a sewer is laid in an unpaved street, connections are made to the adjacent property, whether occupied or not, as a part of the sewer contract and their cost assessed against the lots benefited.

When a street is ordered paved or repaved the public service corporations should be notified in advance of the fact, and also notified to construct any proposed extensions or make any necessary repairs, with a statement that for a certain length of time (say two or three years) no openings will be allowed in the pavement except for repairs to existing structures. If the corporation work could be done the season before the paving work there would be less danger of damage to the pavement.

Another method is the one adopted in Philadelphia in 1889 and in Brooklyn some six or seven years ago, of making a complete survey of the underground structures and mapping them. At the present time, in New York, when a corporation wishes to lay a new main in a street, it must first dig test pits to ascertain the location of the existing subsurface work, as very few records of this work have been kept. This causes a great many openings to be made that will not be utilized in the construction of the new main and even then does not determine entirely what is in the street, so that after the line has been laid out and partially constructed it is often found necessary to delay the work long enough to have special pieces constructed in order to avoid unknown and unexpected obstacles.

The survey work in Brooklyn has proceeded so far that the subsurface structures of a considerable portion of the borough have been plotted accurately. All applications for underground work are referred to the engineer in charge of the subsurface bureau, who, after an examination of the plans, assigns in the street the location for the proposed structure. This not only reduces the tearing up of the pavements to a minimum, but it also conserves the area of the street for future work. By locating the water mains of Brooklyn's new high-pressure system in accordance with the knowledge gained by the surveys of subsurface structures it is estimated that this bureau has saved the city an amount considerably more than the entire cost of the bureau to date.

From a study of the condition of pavements which have been laid in front of cemeteries, parks, churches, etc., where street openings are not often necessary, Mr. Tillson believes that, as a whole, street pavements, at least in the business part of any city, are damaged to an extent of 25 per cent. of their cost by street openings.

Cause and Prevention of Concrete Failures

It is a peculiarity of the failure of every concrete structure, where the primary fault is in the design or construction of the concrete or of its reinforcement, that a very apparent cause can soon be found, and that that cause is one which should have been apparent to anyone claiming more than an elemental knowledge of the science of building in concrete, says Engineering News.

With a regularity almost monotonous we read of insufficient reinforcing connections, of improperly mixed concrete, of frozen material, of thin supporting struts, and of premature removal of forms, until we wonder what is the nature of men who will not learn the fundamentals of a business at which they hope to earn their living.

There does not seem to be any good reason why the concrete building business should not be conducted in the same manner as the building of steel structures. Why should not every architect be competent himself or have associated with him an engineer competent to design the concrete structure? Why should not this expert prepare the general structural drawings for the building upon which competent contractors may bid? Once the bid is awarded, taking into account both the competency of the bidder and the prices bid, the successful contractor could himself prepare the detail plans showing method of erection, minor steel details, etc., exactly as the steel companies now prepare shop drawings showing erection methods and connection details for the approval of the designing and supervising engineer of a structural steel building. This would remove the commercial element from design and would surely tend toward safer buildings. Such methods are very generally in use, and the buildings so erected are of the class which make the reputation of reinforced concrete as a building material.

The massive C. P. R. bridge across the Saskatchewan River at Outlook, the connecting link on the main line between Winnipeg and Edmonton, has been completed. The last girder was put into place recently and immediately the work of laying the rails was commenced. This bridge is one of the biggest in western Canada, being over three thousand feet in length, and 156 feet in height. The construction work was commenced in 1909, and is conceded to be one of the biggest undertakings ever attempted to cross the Saskatchewan river. There are nine piers of solid concrete and the piers are 110 feet above the water level with a steel superstructure 16 feet high.

The Problem of Purchasing Material

Analysis Discloses Three Parts: Quantity, Quality and Price —The Principles which Govern the Estimation of Each

SOME interesting observations on the above subject are made, in a United States contemporary, by L. S. Randolph, who observes that the problem of purchasing material naturally separates itself into three divisions: first, the quantity; second, the quality; third, the price. These three are inter-related in a very complex manner, so complex in fact that the problem of purchasing the required material for the least amount of money is beyond the domain of accurate analysis and has passed into that wide, indefinite terra incognita of good judgment sometimes profanely called guesswork.

The considerations affecting the resolution of the problem which are involved in the question of quantity are:

1st. The loss on large amounts of stock or stock carried for a long time, caused by the loss of interest, the depreciation and insurance (depreciation including the item of obsolesence on money invested).

2nd. The saving, in the lower price quoted universally for large orders, the lower freight rates obtained on large shipments and the monetary value of the promptness with which orders can be filled from large stock.

These two items must be balanced, the one against the other, so as to bring about the minimum expenditure. When money is plentiful the problem can be solved with quite remarkable accuracy.

When money is not plentiful large rates of interest, which are difficult to determine, must be paid. The loss due to high interest charge makes the economically carried stock account small.

It will be readily seen that the problem with which our investigation starts admits of no general solution, but is dependent upon the peculiar conditions surrounding each establishment and under which each establishment is operated.

Modern Method of Stock-taking

The modern method of stock keeping gives such accurate control of the amounts of stock and orders that it is almost indispensable for the accurate solution of the above problem and should be used whenever possible.

In brief this method is as follows:

Each item of stock is listed on a card of an index and on a similar card on the bin, giving: the item, size, grade, minimum stock to be carried, maximum stock to be carried and amount of order to be placed when the minimum stock amount has been reached. The amount of the order is usually the difference between the minimum and maximum stock requirements.

The demand for stock may be:

1st. Small and certain but at infrequent intervals. 2nd. Uniformly constant demand as when the continuous process of manufacture requires a continuous supply of material. 3rd. Large but uncertain demand as where material is kept on hand to supply sudden calls for repairs and renewals.

The first and last of the above are those which are more difficult to handle. In the majority of cases the tendency is to carry special stocks too long and to have them too large. In the last case particularly large stocks are only justified by keeping up the good name of a house or where the loss of revenue from a shut down is considerable.

The next item in our problem is the kind and quality of the material to be purchased.

The quality of a material may be defined as those peculiarities, characteristics or properties which fit it for the work which it has to perform; or having which it is identified as a material suitable for the work in hand. When we say good quality we mean that the peculiar properties are such as to fit it in an eminent degree for the work it has to perform.

It should be understood that the properties which we observe are not always those which are valuable or necessary, but those which can be used to identify the material which has those properties which are valuable.

For example, it matters little what the specific gravity of lubricating oil is, except that an oil with a certain specific gravity has one of the elements which identify it as being an oil with the lubricating properties we desire. The same thing may be said of color, taste and smell. In fact, in the case of lubricating oil the properties of the coefficient of friction and durability in service are not susceptible of sufficiently accurate observation to be used, but we rely on those other properties which are used to identify the oil as one having the coefficient of friction and durability we desire. The freezing point of an oil, like the ultimate tensile strength of steel, is a direct measure of one element of its usefulness.

The quality of the material, then, must be such as will do the work required of it at the least cost. We might state this differently and say that quality is the best which gives the largest results for the least cost; as the greatest resilience of a bar of iron or steel for the least amount of money.

In determining the value of a lubricant, the sum of the cost of the lubricant used, the cost of the material worn from the journal and brass and the cost of the power required to overcome the friction gives us the measure of the value of the lubricant. Careful experiment will show that the cost per gallon is a very secondary matter. The tendency to heat should also be included where that is likely to occur, as on railroad trains.

The Least Important Factor

One of the most important points in the purchase of material, the one most frequently neglected and least understood, is that the price per unit is usually the least important factor in determining the value of a commodity.

Under the head of material there must be considered:

1st. The kind of material.

2nd. The quality of material.

Material is at the present time almost always purchased under written specifications. It matters not.

however, whether the specifications are written or not, the principle is the same, as a specification is merely a statement of what it is desired to purchase and will be accepted.

In the draughting of a specification or the determining of the material to be purchased the following principal consideration is involved:

The cost of the material should be a minimum for the work to be performed, or that which will produce a minimum of expenditure.

In order to obtain this result careful investigation must be made as to the cost of the different qualities of material, in order to determine the maximum quality for a minimum cost.

Thus the cost of bar iron on one occasion varied with the quality as follows:

Tensile strength	Elongation, per cent.	Cost per pound, cents
48,000 lbs.	18	1.4
50,000 lbs.	18	1.5
52,000 lbs.	18	2.4

In the last case we got 4 per cent. greater strength over the second case at a cost of 60 per cent. more. We get 4 per cent. more strength in the second case over the first at a cost of 7 per cent. It is manifest that unless the question of weight is of more importance than usual, the last case is not justified. Where, as in steamships or battleships, weight is of enormous importance, it may be justifiable.

This principle runs through all classes of specifications, and in fact is the basis upon which all accurate decisions of the proper kind and quality of material to buy must rest.

Chordal, in one of his letters, says: "Never put a crocus finish on a hand-car crank."

We may briefly state the principle governing the draughting of a specification as follows.:

Require only those properties or peculiarities which can be clearly shown to be justified by the price to be paid and the value of the work to be done.

Omit all requirements which have not a definite object and value. They only hamper the manufacturer and are usually not observed a short time after the specification has been issued, while the element of uncertainty in them causes an increase in the cost.

Maximum and minimum limits should invariably be specified and these should be as wide apart as possible. It should be always stated whether these are merely desired limits or limits of rejection.

Uncertainty and indefiniteness are the most expensive things about the average specifications. The manufacturer, being in doubt, must perforce take the most expensive construction which can legally be put on the specification or he runs a risk of loss, and to save himself must increase the price accordingly.

The problem of the price is not susceptible of analysis by any present methods. Of course the best price should be obtained. The lowest of a number of different prices is seldom if ever the best. If all parties quoting are of good reputation it may be, but where this is not the case the lowest price is too often from one who counts on getting in his indifferent goods by chicanery or fraud. Even if he is honest, the improbability of his goods being accepted, promptly shipped or properly directed is very great and the consequent loss more than offsets the saving in price.

The fluctuation in prices are very great at times, varying with the season and the variation of supply and demand. When these fluctuations can be foreseen enormous savings can be made. The president of a railroad placed an order one summer for rails for next summer delivery. By the next summer prices had advanced to such an extent that he sold his old rails for enough to pay for the new ones and $200,000 over.

The petty bargainer and the man who is ever ready to cut prices are the ones to be avoided by the careful purchaser.

Winter Programme of Canadian Society

The following is the winter programme of the Canadian Society of Civil Engineers, Montreal: Nov. 7, monthly meeting; Nov. 21, electrical section; Dec. 5, mechanical section; Dec. 19, monthly meeting; Jan. 9, mining section; Feb. 6, monthly meeting; Feb. 20, general section; March 6, monthly meeting; Mar. 20, electrical section; April 3, mechanical section; April 10, monthly meeting; April 24, mining section. The following are the officers: Messrs. Henry Holgate, Chairman, General Section; D. MacPherson, Vice-Chairman; H. H. Vaughan, Chairman, Mechanical Section; H. M. Jaquays, Vice-Chairman; L. A. Herdt, Chairman, Electrical Section; R. M. Wilson, Vice-Chairman; H. E. T. Haultain, Chairman, Mining Section; J. B. Porter, Vice-Chairman; W. D. Baillairge, Chairman, Quebec Branch; S. J. Chapleau, Chairman, Ottawa Branch; A. K. Kirkpatrick, Chairman, Kingston Branch; T. C. Irving, Jr., Chairman, Toronto Branch; J. A. Hesketh, Chairman, Winnipeg Branch; C. E. Cartwright, Chairman, Vancouver Branch; and F. C. Gamble, Chairman, Victoria Branch.

Trackless trolleys for shunting freight cars are now being employed on the Grosse Elbstrasse in Altona, Germany, where there are two standard-gauge tracks, one on the harbor side used as a loading track and the other for handling the cars. Horses and steam locomotives have been used, but the cramped space prevented freedom of action of the latter, since no special engine track could be provided. The trackless tractors receive their power from an overhead line through a rigid trolley. They have a range of motion of 11½ ft. on either side of the line, so they may serve either track freely without interfering with cars which are being loaded. The tractor weighs 6 tons and is operated by a 25-h.p. motor at 550 volts. It will handle six cars at one time, at a speed of about 3 miles per hour. The couplings are controlled from the operator's stand.

Weight of Concrete

The average weight of concrete per cubic foot when molded into beams for flexure tests and into cubes and cylinders for compression tests, is given by the U. S. Bureau of Standards as follows:

Kind of Concrete	Beams lbs.	Cylinders lbs.	Cubes lbs.
Granite concrete	148	148.6	147.7
Limestone concrete........	146.6	146.7	145.7
Gravel concrete........	144.1	144.8	144
Cinder concrete........	119	119.3	118.1

The biggest men in the world to-day are salesmen. They may call themselves bankers, lawyers, engineers or ministers. As a matter of fact, they are all selling their own or someone else's services, and the man who is the best salesman gets the highest price.

Terra Cotta in Structural Decoration

One of the Most Versatile of all Building Commodities—Factors that Contribute to its Growing Popularity*

SINCE the world began there never has been a building material save wood, which has been susceptible of so many applications in the construction of habitations for man as terra cotta as we know it to-day. In fact, with the gradual elimination of wood, even in small cities and in the more progressive towns of the country, it becomes more and more evident that we are returning to the clay age, at least so far as our commercial and domestic shelter is concerned.

Intricate polychrome detail, exemplifying the possibilities of the material

There would appear to be a far cry, for instance, between the sticky clay as it is found in its crude state and the most beautiful terra cotta art work that adorns the exclusive shops of Fifth Avenue, New York, yet even in the realm of craftsmanship, burned clay is making terrific inroads against carved marble and other costly stones.

In the big cities the answer is found in pure economics. In the matter of terra cotta interior decoration, the wealthy man who builded himself a home in Fifth Avenue, Madison Avenue or Park Avenue, a generation ago, indulged himself, if he had artistic tastes, in a very costly carved stone mantelpiece, marble or onyx ballustrades and staircases; expensive stone foundations or jardiniers and so on down the line.

To-day, when a wealthy man builds a home, he is more likely to order his mantelpiece of glazed terra cotta, and likewise his balustrades and staircase, his fountain, garden seats and flower urns. And the reason is not hard to find.

The experience of the home builder in New York is in many cases similar to that of home builders in all parts of the country. What may be an exclusive and highly restrictive residential section to-day may, in a generation, be a busy commercial mart. The tone of a neighborhood, in a less congested city than New York or Chicago, is subject to change. Realty valuations are constantly increasing in exact proportion to the increase of population. In order to adapt building to these changing conditions, terra cotta, less costly, but just as beautiful and just as permanent as stone and more fireproof than wood, is gradually taking their place.

The field of architectural terra cotta is constantly enlarging. In such an elaborately adorned hotel as the Prince George, New York, architectural terra cotta has almost entirely supplanted expensive carved stone as a decorative material. In the fountain depicted in the frontispiece, the artistic possibilities of this material as a decorative feature of this hotel are shown. Similar evidences of this tendency are to be found in the leading hotels throughout the country.

But what has terra cotta to commend itself in such a permanent building as a hotel? The question is not as difficult to answer as might appear. Hotels to be popular, must be up-to-date. Modernity is the life of a hotel. An old-fashioned hotel soon loses its prestige among the element in our civic life commonly known as "The Spenders." Georgian architecture

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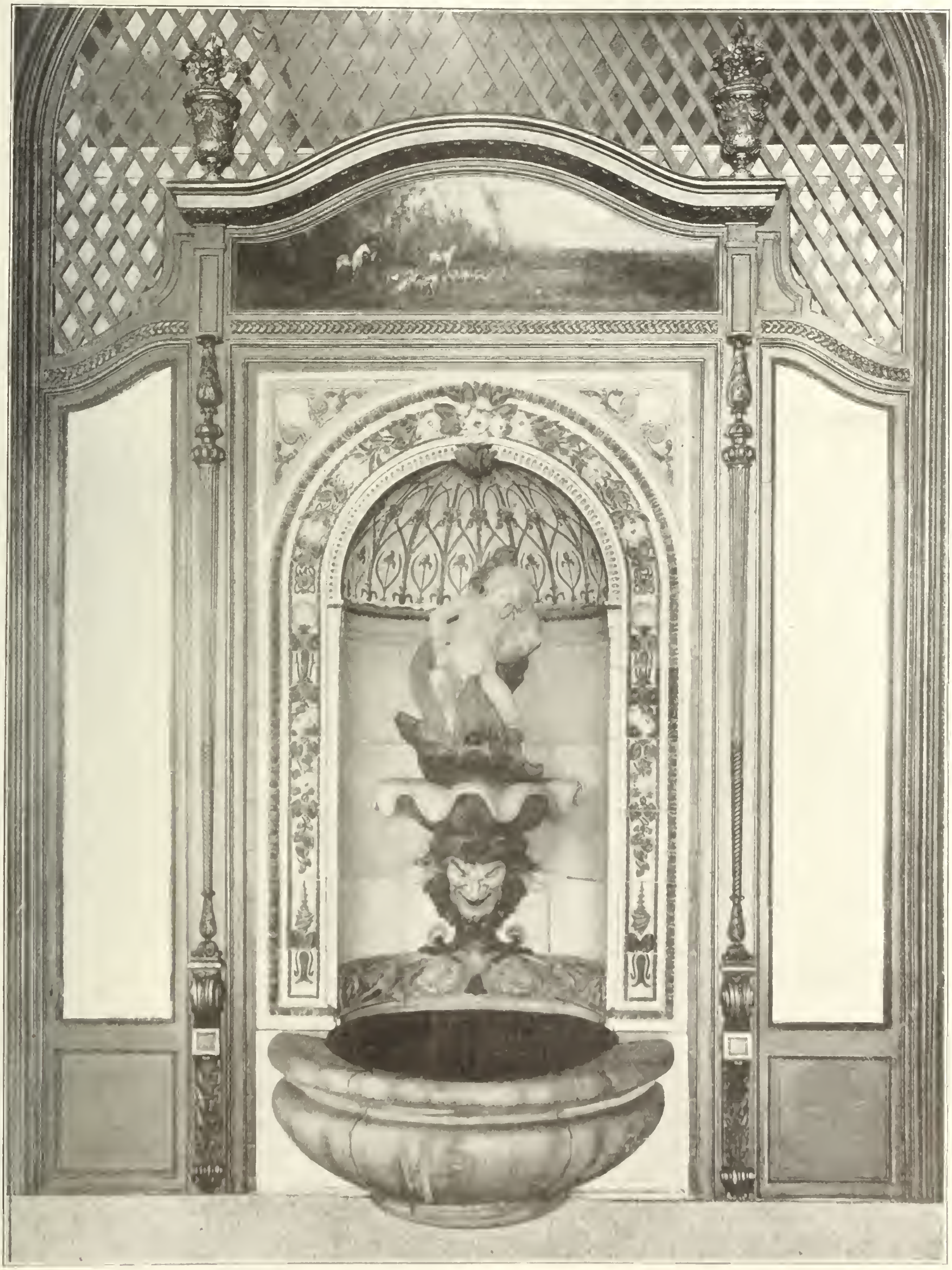
*By Allen E. Beals, in the Brick and Clay Record

ART AND BEAUTY EXPRESSED IN BURNED CLAY



Courtesy of Brick and Clay Record

The decorative possibilities of architectural terra cotta are clearly shown in the above reproduction of the handsome fountain which adorns the Prince George Hotel in New York City.

may be popular to-day and to-morrow Elizabethian or Colonial styles may be the rage. A hotel operating company would not find it provident to remove a $4,000 to $40,000 stone fountain or a grand stone stairday to keep their hotel up-to-date, whereas they would not hesitate to spend $500 or even a thousand dollars to replace a terra cotta piece that had passed beyond its architecural limit of three score years and ten.

The same reason holds true all down the line of structural interior decoration. No home owner can tell what conditions will arise to make his house deteriorate in value or what may ensue to cause him to dispose of his holdings. A wrecker places little value on costly stone art work in a building, because the mere dismantling of it renders it comparatively valueless and what may appear artistic to the original builder, will appeal to the subsequent purchaser as whimsical and inappropriate.

But where architectural terra cotta is employed its removal is a simple matter and the loss in money invested in it is negligible.

The utility of terra cotta, as a basic building material, has long been realized, and, thanks to the wide publicity which is being given to it to-day, it is gaining in popularity daily. But as a facade material, its principal claim to present-day popularity is primarily due.

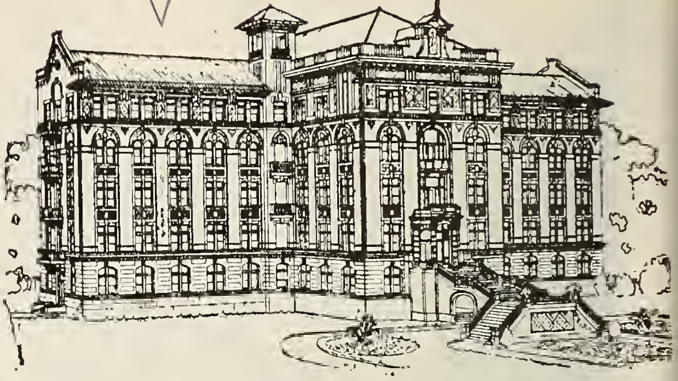
It has lightness and strength, besides having the durability of stone, it has more permanency of color, is the most fireproof material known and above all, is inexpensive. All these factors have combined to give it the same relative position in making the skyscraper possible, that has been accorded to the elevator, for without this light, permanent, fireproof and strong building material, the cost of a towering building built of stone or marble would be almost prohibitive and the extra cost in heavier steel skeletons would bar all buildings over eight storeys high.

Some of the terra cotta companies have been experimenting with various clays with the idea of even extending the utility of this material as a decorative medium. Ceramists have been devoting much time of late, in an effort to produce a hybrid clay that will eliminate, as far as possible, practically the last difficulty in manufacturing art terra cotta faience and art ware; namely, excessive shrinkage. The results of these experiments are, of course, shrouded in secrecy.

It has been proved according to one authority that plasticity of clay combined with a dense body, burned at a low temperature that will produce a deep red, gives the best results. About 33.7 per cent. of water is used in working it up. With this clay incipient vitrification occurs at .03 with 12 per cent. shrinkage and complete vitrification at 4. Viscosity is placed at 6. Soluble salts contained in such clay should not exceed 25 per cent. and, after burning, a tensile strength can be figured on of from 75 to 90 pounds a square inch.

But this analysis, as has been intimated, is not by any means universal. Clay compositions vary, no two companies using the same formula. The glaze or slip is also a close secret with every architectural terra cotta manufacturer as is the method of obtaining different polychrome effects.

Suffice it to say that architectural and art terra cotta manufacture has been brought within the last five years to a high state of perfection in this country, and the product equals that turned out by ancient manufacturers in the old world, and, besides, the cost of production has been much reduced, thanks to the training given to ceramists in our native economic schools, so that to-day, terra cotta is the most economic building material that can be used in building construction or decorative structural work.



St. Paul's Hospital, Vancouver, as it will appear upon completion

But has the sales department's work reached its highest state? Have the advantages of terra cotta, as a structural decorative material been made as apparent to the home owner or the architect, as they might be? Cement is a competitor, but it never can be made proof against crazing or checking as architectural terra cotta can. Is there not room for a country-wide campaign whereby the merits of terra cotta can be fully and convincingly laid before owners of buildings? It has been attempted, by associations and co-operation in some centres, notably, in the East, but it has not been developed to the high degree of thoroughness that is possible. Architectural and art terra cotta have a place in the construction of the suburban home and in the city dwelling, but do the consumers know it?

St. Paul's Hospital, Vancouver, B. C.

The accompanying illustrations are the architect's perspective and a recent constructional view of the new St. Paul's Hospital at Vancouver, B.C. Rapid construction work has been much in evidence since the commencement of operations. Exclusive of power house and laundry, the building will cover an area of 15,000 square feet. Its length is 200 feet. The construction is of reinforced concrete faced with pressed brick with terra cotta and stone dressing, and the cost is estimated at approximately $400,000. Mr. R. F. Tegen is the architect, and the Norton Griffiths Company is the contracting firm.

St. Paul's Hospital, Vancouver, under construction

Building Concrete Houses Without "Forms"

As showing the possibility of making concrete serve as its own form by erecting the work by stages the following description, contributed to Building Age by John J. Smith, architect and concrete engineer, Boston, Mass., may not be without interest to many of our readers.

The foundation wall was of reinforced concrete built without wood forms. Expanded metal rib studs were set up 14 in. apart and a stiff metal lath wired to both sides of studs (which are made 6 in. apart) gave a form for the wall and also provided reinforcement set up in place. The outside of these walls was given a heavy coat of cement mortar containing a little lime and hair. This when set made a rigid hollow wall which was then filled solid with concrete mixed in the usual way (but not too wet) in proportion 1:2:4. The walls, both inside and out, were floated to a sand finish with a wooden trowel. This made a very strong substantial wall built without wooden forms and only required a single bracing for the metal studs, using a piece of 2 x 4 as a straightedge and bracing either inside or outside, as most convenient, by driving stakes in the ground.

The walls of the house were made by setting up 2 x 4 studding similar to the balloon frame, but omitting the corner and other posts, also the girts and substituting in place of these solid concrete posts and girts reinforced with two pieces of the metal rib studs, which for the girts were bent in the form of a truss. Metal strips were nailed to the studding on which were applied metal lath; this was then coated with cement mortar, using lime and hair sufficient to make it trowel readily. The metal lath was backed up on the inside with a cement mortar, so as to bury the metal at least 1 in. The outside was then given a second coat of cement mortar made three of clean, sharp sand and one of cement. This is mixed with a waterproofing compound and stippled, while the wall is green, with a mixture of one of sand and one of cement well beaten to the consistency of a thick cream and applied with a kind of brush made by tying together a bunch of light twigs.

Marble in Roman Houses

It was not till the latter times of the Republic, when wealth had been acquired by conquests in the East, that houses of any splendor began to be built in Rome, but it then became the fashion not only to build houses of an immense size, but also to adorn them with columns, paintings, statues and costly works of art. M. Lepidus, who was Consul B.C. 78, says a writer in an English journal, was the first who introduced Numidian marble into Rome for the purpose of paving the threshold of his house, and the fashion of building magnificent houses increased rapidly. Lucullus especially surpassed all his contemporaries in the magnificence of his houses and the splendor of their decorations.

Marble columns were first introduced into private houses by the orator L. Crassus, but they did not exceed 12 ft. in height, and were only six in number. He was, however, soon surpassed by M. Scaurus, who placed in his atrium columns of black marble called Lucullean, 38 ft. high, and of such immense weight that the contractor of the sewers took security for any injury that might be done to the sewers in consequence of the columns being carried along the streets. The Romans were exceedingly partial to marble for the decoration of their houses. Mamurra, who was Caesar's praefectus fabrum in Gaul, set the example of lining his room with slabs of marble.

Some idea may be formed of the size and magnificence of the houses of the Roman nobles during the later times of the Republic by the price which they fetched. The Consul Messalla bought the house of Autronius for 3,700 sestertia (nearly £33,000), and Cicero, the house of Crassus, on the Palatine, for 3,500 sestertia (nearly £31,000). The house of Publius Clodius, whom Milo killed, cost 14,800 sestertia (about £131,000); and the Tusculan villa of Scaurus was fitted up with such magnificence that when it was burned up with slaves he lost 100,000 sestertia, upward of £885,000.

The house rent which persons in poor circumstances usually paid at Rome was about two sestertia (between £17 and £18). It was brought as a charge of extravagance against Caelius that he paid 30 sestertia (about £266) for the rent of his house.

Stains on Brick

The brown, white and yellow stains which frequently disfigure brick buildings or walls are the result of a saline efflorescence which may sometimes be removed, according to the Bibliotheque Universelle, by washing with slightly acidulated water, when pure water proves inadequate. Prevention, however, is better than cure. The stains are caused by particles of soluble salts which have been carried to the surface by water and are then crystallized by evaporation. These comprise sulphates of potassium, sodium, aluminium, magnesium, and calcium, the last being the one commonest found and the one most resistant to rain. Chlorides and carbonates are also often found. These salts pre-exist either in the earth or in the waters used in manufacture, or in the mortar or sand, the latter being especially the case near the seashore, where sand from the beach is commonly used without the precaution of washing with fresh water. The entry of salts into the brick may occur during the baking, also, when the coal contains pyrites. Care should be taken to use water of low mineral content, especially as regards sulphates. Where only "sulphur water" is available it should be neutralized with a barium salt (the chloride or carbonate).

The old question of the disintegration of cinder-concrete comes up anew, and in a recent paper published in the Journal of Industrial and Engineering Chemistry considerable data are given showing the results of various experiments made with this material. Practically the same conclusion was arrived at that was reached in the discussion of the New York Building Code a few years ago, namely, that cinders with much sulphide and sulphate of sulphur are likely to give unsatisfactory results, especially if there is much porous material present. The suggestion is made that the cinders are better if allowed to weather, or are washed, so that the ferrous iron and sulphur may be oxidized and bleached out.

To prevent concrete slabs from atmospheric attack, they should be dried after leaving the press, and then coated with a layer composed of benzine or benzole with 1 pint beeswax. Then they should be washed clean in water and left exposed to the air for several days, after which time they are stored to cure in a dark, dry place.

The Importance of Testing Sands

By C. M. Chapman*

THERE is no novelty in the assertion that the quality of the sand used in making Portland cement mortar or concrete is a very important consideration. Neither is there anything new in the statement that many of the difficulties, or even complete failures, experienced with concrete which are charged up to Portland cement are actually due to poor sands. But, in the face of repeated assertions of these facts by competent and recognized authorities on the subject, there are still firmly fixed in the minds of many engineers and contractors convictions that "sand is sand" and that a mixture of one part of cement, two to three parts of any old sand and four to six parts of broken stone or gravel will make good concrete. The average engineer or contractor fails to realize that slight differences between two available sands which may be used on a piece of important construction may contribute largely to the success or failure of the finished work. This lack of realization on the part of the engineer or contractor of the importance of the quality of the sand used is responsible for at least some of the difficulties encountered in the use of concrete which might be avoided by a better understanding of the subject.

In an eastern city the writer found that a sand of very inferior quality had been used in nearly all the construction work carried out during many years. This sand did not develop much over one-half the strength of Standard Ottawa sand in short time tension tests, and yet the question of quality had never been raised by a local engineer or contractor. The sand dealers had never been asked a question relative to the quality of the local sand, nor had they ever heard of the possibility of its being of inferior grade. One dealer in particular had a considerable quantity of sand on hand which he was willing to dispose of at a low price because it contained coarse particles and was of a dark color. It was not considered a good sand because of the variation in the size of the grains, and he had experienced some difficulty in disposing of it. Yet this sand when tested proved to be of a decidedly higher quality and more suitable for concrete work than other local sands commanding a 50 per cent. higher price. This condition of affairs is regrettable and it appears to be the duty of the technical press and of technical societies to emphasize the necessity of properly testing all sands entering into important concrete structures.

In the following discussion the term sand is applied to the fine aggregate used in mortar or concrete, whether it be a natural sand or an artificial sand produced by crushing and screening stone.

In general, the defects in a poor sand may be classified into the two broad subdivisions of size and presence of deleterious material. The defects of size are chiefly those in evidence where individual grains prove to be either too fine, too coarse or too uniform. Deleterious matter that may cause defects include organic matter, ores, clay or other soft or finely divided powder which prevents a proper bond between the cement and the sand. Also the entire make-up of the sand may be of such a nature that strong, sound concrete cannot be made from it.

Size Requirements

The requirements as to size are not very strict. By this is meant that no very definite line may be drawn as to the limits and distribution of sizes which are permissible in a suitable sand. For example, a sand may contain as much as 20 per cent. of fine material passing a 100 mesh sieve and still be first class, while another may be ruined by the presence of even 5 per cent. of material possessing the same degree of fineness. As a general thing, an artificial sand or crushed stone may with safety contain a greater percentage of these "fines" than a natural sand.

A sand which is too coarse, as for example, one in which not enough fine or small particles are present to fill the voids between the larger particles, will require an abnormally high proportion of cement to make a strong dense concrete. Similarly sand in which the variation or gradation in the size of the particles is within narrow limits will have a high percentage of voids requiring a large amount of cement to produce good results.

Foreign Matter Requirements

The requirements as to deleterious matter are much more stringent than those relating to size. The presence of a very small percentage of loamy soil or organic matter in a finely divided state may render an otherwise suitable sand totally unfit for use so long as the organic matter remains in it. The amount of objectionable matter present may be as low as ¼ of one per cent. and still cause serious trouble.

In some cases the presence of a small percentage of metalliferous ores in the sand has caused subsequent failure of the concrete, in which it was used, by disintegration due to chemical change in the metallic constituent.

In bank and river sands a considerable quantity of clay or other finely divided, though inert, material is often present. This clay or silt may have been carried down through the sand bed by percolating waters and so be fairly uniformly distributed through the mass, or it may have been deposited in layers or seams in the sand bed and then remain more or less distinct and separate from the remainder of the deposit. In some such cases the objectionable strata or seams may be removed when the sand is taken from the deposit. The amount of such material which is capable of causing trouble seems as yet a rather uncertain quantity. In some cases trouble has been charged to as little as 2 or 3 per cent. of silt or clay, while other sands containing as high as 15 per cent. have given excellent results.

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The cases in which the material as a whole is unsuitable are those in which the sand is composed of a soft, porous, or brittle substance which could not produce a hard strong concrete even when properly combined with the cement.

The best method of ascertaining the extent to which a given sand possesses the objectionable qualities above mentioned has never been standardized or fully determined. Although a test is now in use which will show the general quality as compared with the Standard Ottawa sand, yet this test does not show wherein lies the defect if the sand is poor. This test consists in making 1 to 3 cement-sand mortar briquettes of the sand to be tested and also of Standard Ottawa sand and comparing the results of the tension test of these two sets of briquettes.

Sand Tests

Two general classes of tests may be applied to a sand. (1) Tests to determine the general suitability of the sand, that is, the quality of the mortar or concrete that the sand will make. (2) Tests to determine the characteristics of the sand which have an influence on its quality. In the first class belong such tests as compression, tension and density tests of specimens made up with the sand under test. In the second class are such tests as sifting or sizing, determining amount of silt, organic matter, voids, etc. A sand which gives high results in tests of the first class need not be subjected to tests of the second class, because a sand which makes good concrete may have what characteristics it will.

The details of the many tests which are of use in an investigation of the quality of a sand vary greatly with different investigators. As a general thing, tests of the first class, designed to ascertain the quality of the concrete or mortar which a sand will produce, consist in making up briquettes of standard size and cubes, usually 2 in. on a side, of mixtures of one part of Portland cement, preferably of the brand that is to be used with the cement on the job, and three parts by weight of the sand under test. At the end of 3, 7, or 28 days or all of these periods, these briquettes are broken in a testing machine, in order to ascertain their tensile and compressive strengths. Similar briquettes and cubes are usually made of the same cement and Standard Ottawa sand and broken at the same time, in order to secure a comparison between the two sands. As a means of judging its quality, it is commonly required that the sand under test shall show a strength of at least 70 per cent. that of Standard Ottawa sand. Tests of this class likewise include determining the amount of absorption of a specimen of mortar made from the sand under test. This indicates the density of the mortar and its freedom from voids.

As stated above, a sand which shows high strength tests and a satisfactory density need not necessarily be tested further unless one wishes to ascertain the characteristics which go to make up a good sand. If, on the other hand, a sand shows low strength or high porosity, it may be possible after determining the cause of the weakness to remedy the trouble and produce a stronger or more dense concrete or mortar. If the sand is found to give weak mortar because of the presence of clay or silt, the trouble might be eliminated by washing the sand, or if the product is porous because of a higher percentage of voids in the sand than the cement will fill, the density may be increased by adding a proportion of another sand to produce a better grading of the particles.

Thus by means of properly conducted tests it is easy to determine the relative suitability of a sand for use in making mortar and concrete, and in many cases of poorer sands, it is possible to determine, and in some cases remedy, their existing weaknesses. There are, however, many deposits of sand which will not, in one to three mixtures, show a strength equal to 70 per cent. of that of standard sand and yet contain nothing objectionable for use in concrete. By using a greater proportion of cement with these sands, a concrete of ample strength may be made which should be in all respects as desirable as another concrete made of a better sand using less cement.

In some localities the only sands available at reasonable cost give low strengths as compared with other and better sands, yet there does not appear to be any good and sufficient reason why these sands should not be used even in important structures if sufficient cement is used to give the required strength. This being the case, it would seem that the proper tests to be applied to such should be those that would determine, first, whether the sand contained matter detrimental to good concrete, and second the proportion of cement to be used with it to produce a concrete of the proper strength for the purpose for which it is to be used.

Such a procedure seems to the writer to be the proper one to pursue under these conditions, and the matter is one which merits the attention and investigation of engineers and contractors interested in the subject.

Earth Dam, Stockport (Eng.) Waterworks System

An earth dam, 116 feet high above the original river bed and 1200 ft. long forms part of the new water-works system of Stockport, England. The structure extends across the Kinder River and forms a reservoir with the area of 44 acres and a capacity of 515,000,000 gal. The cut-off wall in some places was carried to a depth of 200 ft. according to "Engineering"; the excavation was made by driving galleries along the line of the trench at various levels for it was considered unsafe to rely upon timbering in an open trench. About 57,000 cu. yd. of concrete were placed in the cut-off trench. When the foundations had been obtained and refilling commenced the ground previously left in was removed as the concrete approached sufficiently near to support and permit this to be done. In spite of these precautions, however, the sides of the trench for a depth of about 100 ft. sank and squeezed in the sides of the trench until the width was reduced nearly 2 ft. This portion of the trench had to be opened out again. In the main embankment 600,000 cu. yd. of material were placed; the puddle wall required 75,000 cu. yd. During the summer months as much as 15,000 cu. yd. of embankment were placed in a week.

A hypochlorite plant has recently been installed for the purpose of treating the water supply of Athens, Ga. After dosing with 5 lb. of bleach per million gallons, the first day's run showed four bacteria per cubic centimeter in the effluent, and on the two days following, sterile water was produced.

Concrete Paving Construction

Advantages and Disadvantages of the Material*

During the past two or three years, many descriptions of concrete pavements laid in various parts of the country have been published and considerable enthusiasm for this class of construction as a pavement on streets having a light to moderate traffic has been manifested by city engineers. It is believed by the writer that there are some grave defects in concrete pavement, which, as far as our present knowledge of the material is concerned, restricts its use to rather narrow limits.

There are two characteristics of concrete which tend to reduce its value as a pavement: susceptibility to changes in temperature and inability to resist abrasion. The coefficient of expansion is high, being about 0.000006, and to make the case more difficult, this expansion often takes several weeks to fully manifest itself. Every one has seen this action in the case of concrete sidewalks. Curbs are frequently sheared off in this way, and an ordinary sidewalk will expand 6 in. in a block of 300 ft., partly the result of temperature and partly of chemical activity while setting up.

It has been stated that the largest part of this expansion is due to moisture, and that if moisture is excluded, the expansion will be almost entirely eliminated. The writer is inclined to question this, for while moisture may accelerate the expansion, it is not believed that it really affects the ultimate condition.

If the concrete foundation of any pavement laid in the summer and exposed for two or three days to the hot sun be examined, cracks will be found at intervals of 10 to 20 ft. extending across the roadway. They are especially noticeable after the cool of the night, during which time contraction takes place. It is probable that two out of three asphaltic pavements having a concrete base show cracks during the winter extending across the roadway at intervals of 50 ft. or so, and examination will show that in nearly all cases the cause is the foundation.

In the past too little attention has been given to this problem. Concrete pavements as laid have been provided with expansion joints transversely at intervals of 100 ft., and sometimes longitudinally along the curb. This amount of expansion joint is entirely inadequate and the result has been that within a short time the surface has become a mass of unsightly cracks

In this connection, it is not amiss to call attention to the effect of the appearance of unsightly cracks upon the value of adjacent property in city streets. Property owners for this very reason have frequently bitterly fought asphalt pavements, many of which in the early years of that industry became badly cracked in a few months after they were finished. It has been suggested by some well known engineers that the cracks in concrete pavements are not of great importance, and if desired, they may be cleaned out and filled with bitumen. This may be all right for country roads, but it certainly would not do for city streets, where the appearance of the pavements has a very decided effect upon the value of the property.

The second important characteristic of concrete, that of inability to resist abrasion, is also very vital, though it may in a measure be controlled by the selection of the stone to be used in the wearing course. The writer is convinced that for such a purpose a very hard, dense stone is required, such as granite or trap rock, and if such stone is not available a very moderate amount of traffic will soon ruin the pavement. Even with the use of granite, and under a moderate city traffic, in two or three years the wear is very apparent.

Recently a news item was published in a technical paper to the effect that some Minnesota officials had inspected Chicago concrete pavements and had been highly pleased with them. The writer does not know how the inspection was made, but thinks it rather strange in view of the fact that, as a street pavement, concrete has not been a success in Chicago except possibly in alleys. In spite of careful construction, nearly all of it has become badly cracked, and where there has been heavy teaming traffic, the maintenance has been very expensive.

Repairs to a concrete pavement are not easily or cheaply made, in spite of assertions to the contrary. It will not do to make a repair by plastering. The section must be cut out completely and a new one put in, and good workmanship is required to get adequate results.

The technical journals of the country have discussed for years the best method of joining old and new concrete. Such discussion is the best possible evidence that to make a satisfactory bond it is not any easy operation, yet it is often asserted that it is a simple matter to make repairs to concrete pavements. Such a statement is misleading.

Concrete lacks a fundamental quality without which it is believed no pavement can be a success; that is, elasticity. In the general theory of pavements some means of sustaining a load and of transmitting the shock of impact to the foundation must be provided. This is done in most of the modern types of construction by dividing the pavement into two separate and distinct parts—the foundation and the wearing surface. The foundation maintains the load and the wearing surface transmits the shock of traffic to the foundations. A brick pavement, for instance, is usually composed of either a concrete or a well compacted macadam base, over which sand is placed to form a cushion upon which the brick or wearing surface is laid. The function of the brick is to withstand the action of traffic, both through impact and abrasion. The sand is a medium through which the shock is transmitted to the base which really maintains the load.

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*By P. E. Green, Consulting Engineer, Chicago, in the Engineering News.

Concrete has not the power to resist either abrasion or impact to so great an extent as brick, and is thus less fitted for a wearing surface. If such a pavement, for instance, was made in two courses with some such material as sand between these courses, the lower course or base might possibly wear too rapidly to compare economically with any of the other styles of pavement in the same class as regards first cost and maintenance.

There has been recently a considerable advocacy of covering the rough surface of a concrete pavement with a mixture of bitumen and sand, the bitumen being generally tar. The cost of this treatment is not high, running from 10 to 20 cents a square yard. At first sight this would appear to be a good idea, but experience with bituminous macadam and sheet asphalt tends to make the writer believe that it should be accepted with caution.

In the first place both tar and asphalt are very susceptible to changes in temperature, and tar especially so. Also tar having a high melting point is largely pitch, and at low temperature is very brittle. Hence, if there is even a moderate amount of traffic on the pavement in sold weather, it will tend to spall off in large patches if the concrete is at all smooth, giving the pavement an unsightly appearance. If a tar having a lower melting point is used, the result will be bad in hot weather, the surface becoming soft and sticky. If a blown oil asphalt be used instead of tar the result would probably be still worse, as such asphalt has not great binding qualities and the scaling under traffic during winter would be even more noticeable, though in summer the asphalt would not be so affected by the high temperature. It would mean, therefore, as if on high-class residence streets, which receive a daily cleaning, that the use of this method is questionable.

Summary

In any case, in order to keep such a pavement in good condition, under a moderate traffic (for example, of 150 vehicles per 24 hours) it would be necessary to resurface with bitumen at least once in two years, and probably once a year, and of the average cost per square yard be taken at 15c., it will be seen that there is a decidedly high annual maintenance charge against this pavement. An economic comparison with a block or an asphalt pavement will show that it would be much better to put in the more expensive product.

To sum up, the advantages of concrete pavement are:

(1) Cheap first cost,
(2) Dustless and sanitary,
(3) Good appearance if no cracks appear,
(4) Easily cleansed.

Its disadvantages are:

(1) Liability of cracking,
(2) Inability to withstand abrasive action,
(3) Bad appearance if cracked,
(4) If covered with bitumen, high maintenance charges.

Weighing these advantages and disadvantages, a proper location for such a pavement can be selected.

(1) In alleys. Here the traffic is generally light, appearance not so important as in the street and the arched form of the pavement makes it present its line of greatest resistance to temperature stresses.

(2) In streets of light traffic (less than 100 vehicles per day) in climates having small variations in temperature, such for example as New Orleans, Los Angeles, San Francisco, Portland, Seattle.

(3) In inclosed areas such as warehouse floors, etc., over which considerable teaming is done, but which do not suffer from extreme ranges of temperature and in which the traffic is very slow moving.

(4) Country roads where the value of the property would not be affected by cracking, etc., and on which 250 vehicles per day would be considered a heavy traffic. Its resistance to the abrasion produced by automobiles is high, and it can take a large amount of such traffic. The State of Ohio has made some valuable experiments along this line.

(5) City streets having such steep grades that practically no teaming can be done, and where the property, though not valuable, desires to have some form of cheap pavement. As an example, Kansas City, where many of the streets have very steep grades.

Improper locations for concrete pavements would seem to be:

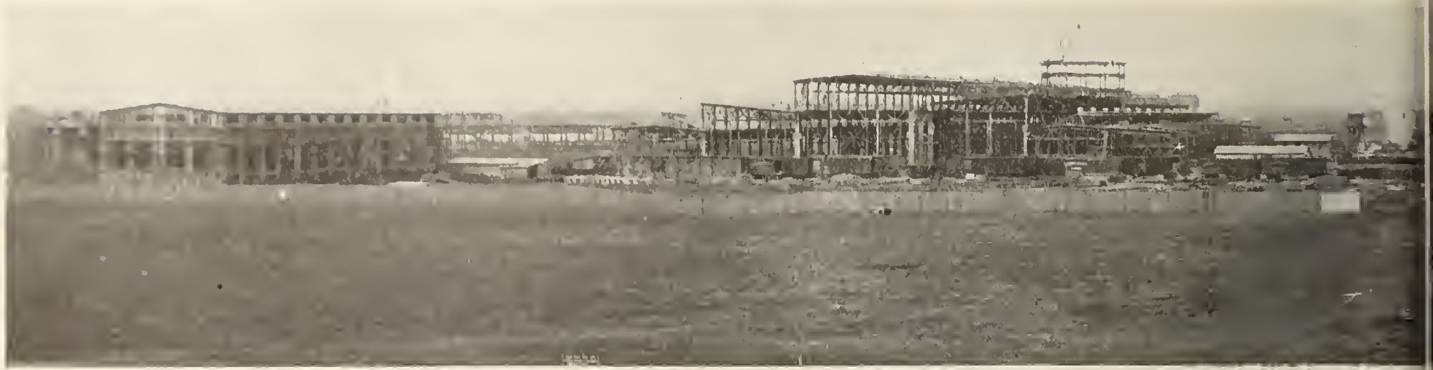
(1) Streets of more than a very moderate traffic, that is greater than about 200 vehicles per day.

(2) Streets in climates having great variations in temperature, such as Chicago, Gary, Indiana; Cincinnati, St. Louis, etc. In such climate it is necessary to place expansion joints very close together, and every expansion joint is a line of weakness, and a place where rapid abrasive action will become very evident.

Concrete is a valuable and useful material, but it has not yet been demonstrated by time and use, that it is a good city street pavement. A pavement, to be considered a permanent one, should be able to give at least 10 years' satisfactory service under a moderately heavy traffic, during which time the cost of repair should not exceed one-half the original cost of the pavement. It would seem, therefore, as if much money might be saved to cities contemplating the use of concrete pavements if they would follow the practice of the French engineers and refuse to lay any considerable yardage of pavement until time and traffic had approved its usage.

A 72-ft. dome for the Linden Baptist Church, Camden, N.J., has thirty-two 10 x 12-in. radial ribs built up of curved 1-in. horiontal boards bolted together. The feet of the ribs are seated on cast-iron shoes supported on a reinforced concrete 10-sided frame carried on 10 reinforced concrete columns. The upper ends of the ribs abut against a 6 x 6-in. angle iron ring and the rafters are connected at the feet by circumferential horizontal rods 1¼ in. in diameter with turn buckle connections. The ribs are sheathed with two courses of 1-in. boards waterproofed with three-ply felt and covered with 1:2:2 Portland cement concrete slabs 1¼ in. thick.

A general feeling of satisfaction prevails among cement manufacturers now that the old duty on cement has been reinstated. At the present time, when the building season is practically at an end, it is not a matter of great importance to them, but they are hoping that when this matter comes before Parliament again the Government will decide to fix the duty permanently as it now stands.



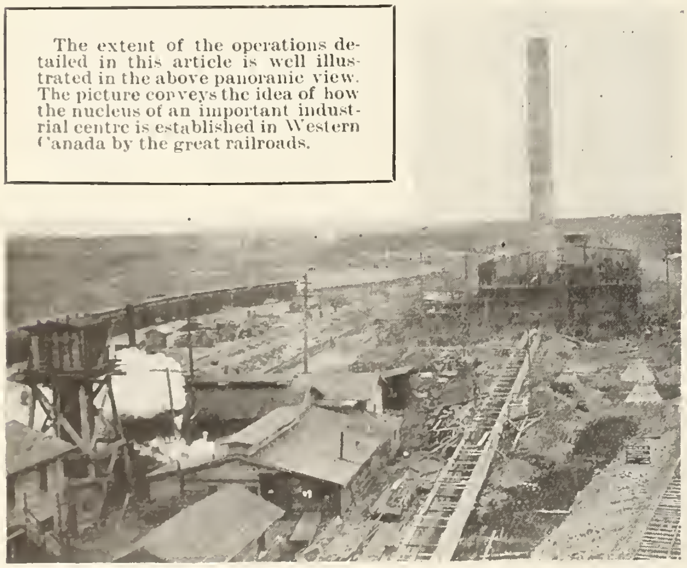
New C. P. R. Shops

The Largest Complete Loco
Shops in Canada Nearing Co

THE new shops of the Canadian Pacific Railway nearing completion at Ogden, Alta., near Calgary, are the largest complete locomotive, passenger car and freight car repair shops in Canada. In the general arrangement the shops are divided into the Locomotive Department and the Passenger and Freight Car Departments. The locomotive shop, tender shop, foundry, store house and material yard, served by the travelling electric yard crane covering an area 80 ft. wide by 760 ft. long, are located on the easterly portion of the property; the coach repair and paint shop, planing mill, freight car repair shop, and freight car repair tracks, are located to the west: with the boiler house located centrally between the two departments, and not far from the planing mill, to facilitate delivering refuse from the planing mill to the boilers. Electric current for operating the shops is purchased from the city of Calgary, so that the purpose of the boiler plant is to furnish steam for heating and other shop uses.

Special provision has been made in the arrangement and equipment provided, for facilitating the handling of material. As arranged, material can be unloaded from cars and stored in the large material yard between the locomotive shop and the storehouse by means of the high speed travelling electric yard crane. This crane is provided with a lifting magnet. The scrap dock is located in the easterly portion of this material yard, and is also served by the travelling electric crane. The principal building is the main locomotive shop, containing the departments of the erecting shop, machine shops, blacksmith shop, and boiler shop. This building is 775 ft. long by 305 ft. wide. The fact that it covers an area of more than six acres, gives an idea of its immense size. The building is constructed throughout, with a steel frame with concrete and tile walls. The window area provided in the walls and roof is unusually liberal, affording excellent daylight lighting.

The extent of the operations detailed in this article is well illustrated in the above panoramic view. The picture conveys the idea of how the nucleus of an important industrial centre is established in Western Canada by the great railroads.



View looking west from roof of locomotive shop, showing pipe tunnel and power house chimney 160 ft. high above foundation.

Freight car repair shop and yard grading, with portion of roof of planing mill

South half of locomotive shop, store house and office, foundry and pattern shop buildings

n, Alta., Near Calgary

r Car and Freight Car Repair of Construction and Equipment

The erecting shop is of the transverse type, where the locomotives in their entirety are lifted over one another. There are 35 erecting pits in the erecting bay, and 8 erecting pits in the north end of the machine shops. The entire erecting shop is served by two travelling electric cranes. The crane on the upper runway is of 120 tons capacity for handling locomotives. A 10 ton high speed crane is located on a lower runway. Jib cranes are located on the face of the building columns, between the erecting bays, for handling small parts.

In operation the locomotives will enter the erecting shop through either of four doors located in the west side of the building, two of these doors being located at either end. The doors are also provided in the east wall, four at the north and two at the south end of the building, through which locomotives may be moved if necessary.

Parallel with and adjoining the erecting shop on one side is the shop for heavy machine tools. Its entire area is served by a high speed travelling crane, material being brought up to the end of machine shop by the travelling electric yard crane, which travels across the end of and outside of the locomotive shop. Another shop bay parallel with the one just mentioned provides space for light machine tools. Travelling electric trolleys suspended on the bottom chord of the roof truss traverses full length of this light machine shop.

The blacksmith shop is placed alongside of and parallel with the erecting shop on the side opposite from the machine shop. The steam hammers and forges are situated in the bay adjoining the erecting shop. The second parallel bay provides space for furnaces, forging machines and other blacksmith shop machinery. This portion of the blacksmith shop is served by travelling electric trolley suspended from the bottom of the roof trusses.

The boiler shop is located end on with the blacksmith shop and adjoining the erecting shop. The portion of the boiler shop adjoining the erecting shop is served by a travelling electric crane. The riveting

Interior view of coach shop building

View looking N. E. from top of chimney, showing tender shop and part of locomotive shop building

Transfer table pit and coach shop building. Sand and gravel pit outside fence line tower is in this department, and is placed between two of the roof trusses, the boiler shop crane passing through under the riveting tower.

The same arrangement is carried out here as in the blacksmith shop, providing a second bay parallel with the boiler shop for the shop tools. The flue rattler is located in a room adjoining. The fuses are passed through the boiler shop loaded on trucks into the flue rattler.

Jib cranes are liberally provided in the boiler and blacksmith shops throughout for handling material at the tools. A travelling electric trolley traverses the full length of the low bay of the boiler shop. The entire building is heated by the indirect fan system. A radical departure is found in the method of distributing the heated air throughout the shops by means of underground concrete and tiled ducts, doing away entirely with the overhead galvanized iron hot air pipes usually found occupying space and obstructing light. Ample provision has been made for all conveniences for workmen, the toilets, lavatories and metal lockers being located in the fan rooms attached to the building. The storehouse combines the office building at one end, the office portion being made three storeys high. A small emergency hospital has been provided in this building.

The tender shop is north of the locomotive shop. This is an L-shaped building, with travelling electric crane serving the portion of the shop where locomotive tenders, steam shovels, and other maintenance of equipment appliances will be repaired, the remainder of the building being occupied by machine tools and the car wheel departments.

The coach repair and paint shop contains 15 tracks and is 150 ft. wide, which gives sufficient space for upholstering and other departments incidental to this shop. This building is of timber framed mill construction, with concrete and tiled walls. In the future when required, a second shop will be constructed on the opposite side of the transfer table for exclusive work as a passenger car repair shop.

The freight car repair shop is also a steel frame building, having 8 repair tracks extending through. The building is of liberal proportions, 300 ft. long by 230 ft. wide; 50 ft. of the width alongside of this building is partitioned off to contain the office heating plant, blacksmith shop and a few wood working tools. The planing mill is 80 ft. by 300 ft., the woodworking machinery being arranged so that material will pass directly through the mill in proper sequence.

A large wooden frame building is erected near the entrance gate at the south side of the property, and contains a kitchen and dining room, where the workmen can obtain meals, and also a large room provided with steam heaters where the workmen can go to eat their lunches. A portion of this building has been carried up two storeys to provide an apprentices school room.

Wells put down on the property equipped with electric pumps provide a supply of water for operating the shops. A steel tank of 125,000 gallons capacity erected on a high steel tower affords storage and head for fire protection and the automatic sprinklers in the building. An auxiliary water supply is provided in a large connection from the city mains. A very carefully selected line of machine tools has been purchased for each of the several departments of these shops.

It was not possible to begin active construction work until April 1st on account of the ground being deeply frozen. Excellent progress has been made, and greater would have been possible but for a shortage of men during the entire year. Several of the buildings are entirely enclosed, and the main locomotive shop building is nearing completion and will be closed in before cold weather. The concrete stack is nearing completion, while the boilers are being erected; a portion of the travelling electric crane equipment and machine tools have also been received and are being erected. All branches of the work are moving along harmoniously to the end that the plant will be completed in its entirety and be ready for occupancy about the end of the year.

The plans for the buildings and for the general arrangement were prepared by Messrs. Westinghouse, Church, Kerr & Company, of Montreal and Vancouver, under the direction of the engineering and mechanical staff of the western lines of the Canadian Pacific Railway. Westinghouse, Church, Kerr & Company are constructing and equipping the plant in its entirety, with the exception of the grading and railroad track work, which is being done by the railway company.

Proposed Specifications for Hollow Clay Tile Building Blocks; End Construction

By Virgil G. Marani[*]

THE article on specifications for hollow clay tile contributed by the writer and reproduced in the Contract Record of Feb. 28, 1912, referred particularly to building tile of the interlocking type, and to the side construction method, viz., when the tile are laid with their voids horizontal in wall construction. At the close, it was stated that if it was desirable to use tile laid with voids vertical, a specification regulating this type of construction should be adopted. The present article is intended to cover that field.

When laying building tile on their sides (voids horizontal) the material is used to the poorest advantage from the point of crushing strenth, for the reason that tile, when so laid, bring into use the smallest amount of square inches of available web section. Again, tile somewhat resembles wood or other fibrous material, which is always weaker to crushing stresses when these stresses are applied at right angles to the grain instead of with the grain, or parallel to it. A microscopical examination of tile will show that this grain is in the direction of the tile as it was pushed through the moulds in manufacture.

Certain tile with an interlocking feature were manufactured near Cleveland, and the specifications given in the previous article were intended to govern and control this particular type of tile.

It was suggested that vertical webs should be spaced not more than four inches apart, and that their thickness should not be less than one-fifth of their height, because of the recognized fact that tile laid on its side does not develop the same crushing strength as when laid on its end. The bedding, it was suggested, should be limited to about 4½ inches, for the reason (as the diagram showed) that in interlocking tile, whatever may be gained in stiffness against buckling by their interlocking feature, is offset by the manifestly impossible condition imposed upon the mason, viz., that of making two mortar joints on different levels at the same operation.

Since mortar joints shrink in proportion to the thickness of joint and the composition of the mortar used, it will readily be seen that a wall laid up with interlocking tile, to have the maximum strength, must be laid with the tile face perpendicular, and at the same time the joints of these two beds must be absolutely the same thickness.

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If any of the T-shaped or interlocking type of tile be laid upon the floor in the position intended for it to be laid in the wall, it will be noticed that it will not stand perpendicular, but will immediately fall over owing to the fact that the centre of gravity of its mass lies outside of the base. This action, or tendency to tip, takes place when laying up a wall, one tile tending to tip out and the next tile tending to tip in, with the result that the mortar used, being of the same consistency for both beds, is squeezed more in the one bed than in the other and vice versa. Therefore we may safely assume that whatever is gained by the interlocking feature of this type of tile is more than lost in the fact that they are laid horizontally (in the weakest position) and that the finished wall contains mortar joints of unequal thickness and compression.

Another objection to the use of many of the types of interlocking or side construction tile occurs in the piers between windows on account of the end openings being exposed. Water will also be more readily conveyed toward the inner shells since the webs are horizontal and continuous, and in many of these tile every alternate joint running through and down the wall adds another medium for the passage of water.

The above objections do not apply to the end-construction method, for the following reasons: There are no end openings. If water should get through the outer shell by careless jointing or improper workmanship and poor tile, it would quickly be carried down the outer shell to the footing, that being the course of least resistance. The vertical joints not being filled solid with mortar (a space of 2 in. or more being left in the middle of the wall) all possibility of water travel through this medium is prevented.

For well proportioned bearing walls, etc., the writer advises laying tile on end, or with voids vertical, and this applies also to tile-floor construction, though in both cases care should be taken to construct so as to have web contact. Where a combination of end and side construction is used, the carrying capacity of the wall is reduced to the strength of the crushing load of the tile loaded when laid on their sides.

It is an acknowledged fact that every pound of material entering into the construction of a building which does not add to its strength, is detrimental to the structure. For this reason and on the evidence of the past these tests which show a greater compressive value for tile than for ordinary brick laid in lime mortar, the writer would recommend that tile should be more extensively used for building walls and curtain walls, etc., where the lightest wall possible is desired consistent with the necessary strength required.

The tentative specifications for hollow clay tile laid on end for building blocks are as follows:

TENTATIVE SPECIFICATIONS FOR HOLLOW CLAY TILE WALLS SET ON END

1.—**Quality.** Tile are to be made of hard burned shale or fire clay, or any clay that will burn to a good dense body without undue warping or checking, and must be burned to such a degree of hardness that they will not absorb more than 12 per cent. of their weight in moisture. The tile should be true and free from injurious checks and cracks. Vertical webs should be spaced not more than five inches centre to centre and should have a thickness of not less than one-half inch for interior webs, and seven-eighth inches for exterior shells. The height of these blocks shall not exceed 12 in.

2.—**Use.** Terra cotta hollow tile may be used for bearing walls four storeys or less in height, or for inclosure walls for skeleton structures of any height where the wall is carried at each storey on steel or concrete beams or girders.

All walls exposed to weather, if of hollow tile, must be of dense material, or they may be hard burned and covered on the exposed sides with at least one-inch Portland cement stucco.

3.—**Laying.** The tile should be so laid in the wall that all vertical webs which are parallel to the face of the wall shall be in vertical alignment with the vertical webs of the adjacent tile below.

Bedding shall be made with cement mortar composed of one part of Portland cement, three parts of clean, sharp sand, and if hydrated lime is used, not more than ten per cent. shall be included.

Vertical joints shall be well buttered with the above mortar before the tile are laid, for a distance of about three inches from both interior and exterior faces.

4.—**Loading.** The loading of hollow tile when laid on end shall not exceed 400 lb. per square inch of net area in compression.

5.—**Walls.** The thickness of walls shall be the same as prescribed in the City Building Code for brick walls, and shall be subject to all conditions relating to increase of thickness necessary by the height or length of walls, or both.

6.—**Factor of Safety.** The ultimate crushing strength of the tile when laid on end shall not be less than six times the load they are required to support.

A New Zinc Bronze

The great strength necessary for bronze used in the construction of machinery, the keen competition existing between manufacturers, and the wide fluctuations in the price of tin, have induced metallurgists to study the question of substituting for the rather expensive tin bronze some special brass compositions (so-called zinc-bronzes), which not only have the advantage of being cheaper, but also by far surpass the tin bronze, so far as the breaking strength and elongation quality are concerned, at the same time offering the same resistance to attacks by acids.

As the result of numerous series of systematically conducting researches, the foundry laboratory of the Engineering Works of Escher Wyss & Company, Zurich, Switzerland, has succeeded in producing a zinc bronze, "Universal Bronze," which, besides being one of the most simple compositions imaginable, possesses a remarkably great breaking strength and tenacity, without presenting the disadvantages outlined above. Tests carried out during the last three years have shown this material particularly suitable for the construction of runners and impellers of pumps and turbines exposed to the wear and tear of high speed water or impure liquid or acids.

At the engineering works of Escher Wyss & Company, at Zurich, Switzerland, and at Ravensburg (Wurtemberg), "Universal Bronze" has been used on a large scale for several years in the manufacture of any kind of machinery parts exposed to heavy and sudden stresses, such as wedges, bearings, bushes, valves, stuffing boxes, screws, screw heads, wings of screw propellers, runners for turbines and tube pumps, etc. Particularly in the construction of turbo pumps for raising impure water or acids this new bronze has been a success.

Messrs. Escher Wyss & Company invite enquiries relative to the purchase of this patent. Application may be made at the head office for Canada, 514 Canadian Express Building, Montreal.

Road Work with Bituminous Materials

Typical Current Practice Considered—Causes of Failure of Various Types of Bituminous Surfaces and Pavements*

VARIOUS kinds of bituminous materials have been used in the United States in the construction of roads and pavements for over fifty years. The introduction of the use of bituminous surfaces and bituminous pavements in the construction of highways outside of built-up districts is of comparatively recent origin in this country, dating practically from 1906. Since that period the growth of the use of asphalts, asphaltic oils and tars has been exceedingly rapid. For example may be cited the increase in the yardage of bituminous surfaces and bituminous pavements constructed with bituminous materials, not including light oils, under the jurisdiction of eight state highway departments of the East. In 1908 the total yardage was 416,700, while in 1911, 17,749,000 yards were constructed The discussion of this subject will be presented in the form of a brief resume of typical current practice and a review of some of the causes of failure of the different types of bituminous surfaces and bituminous pavements.

Bituminous Materials Defined

In order to avoid misunderstandings, the various methods of using bituminous materials referred to in this paper will be explained by the following definitions:

> Bituminous surfaces are those consisting of superficial coats of bituminous materials with or without the addition of stone or slag chips, gravel, sand or materials of a similar character.
>
> Bituminous macadam pavements are those consisting of broken stone and bituminous materials incorporated together by penetration methods.
>
> Bituminous gravel pavements are those consisting of gravel and bituminous materials incorporated together by penetration methods.
>
> Bituminous concrete pavements are those having a wearing surface composed of stone, gravel, sand, etc., or combinations thereof, and bituminous materials incorporated together by mixing methods.

Bituminous surfaces are usually constructed on macadam or gravel roads, or on bituminous pavements or cement concrete pavements. A notable innovation is the use of bituminous surfaces on brick and wood block pavements. In the case of roads, the mode of procedure is to thoroughly clean the surface by sweeping with hand brooms or horse sweepers or combination of these methods. The bituminous material, which is generally heated, is applied to the surface with the aid of pouring cans, hose attached to gravity tanks, hand drawn gravity distributors, horse drawn or power driven gravity distributors and pressure distributors. After a varying interval, some kind of mineral coating is generally applied to cover the bituminous material.

Causes of Failure

The causes of failure of bituminous surfaces are numerous. They may be considered from the standpoint of the condition and character of the original surface, the material used, the method of construction or local conditions.

The failure of bituminous surfaces from the standpoint of the character of the original surface is many times due to failure on the part of those in charge to place the surface in satisfactory condition before the application of the bituminous material. Many cases are noted where bituminous materials are applied over a surface in which are found many pot holes and ruts, or which is dirty due either to accumulated dust and dirt or to the original method of construction. With certain kinds of materials a damp condition of the surface has resulted in failure.

From the standpoint of the physical and chemical properties of the material, many instances may be cited in which failure is due to materials not having the proper characteristics for the conditions under which they are employed. As an example might be cited the case of a prominent thoroughfare in one of our large cities which is subjected to motorbus traffic and a large amount of motor car and horse drawn vehicle traffic. This road is constructed of gravel upon which has been applied an asphaltic oil and gravel top dressing. The surface at the present time in many sections is full of ruts caused by the traffic pushing the material from side to side. Again, the large percentage of volatile constituents contained in certain asphaltic oils has rendered surfaces constructed with them unsatisfactory because of the long period required for these surfaces to "set up" so that the bituminous material will not track or the carpet thus formed will not creep and form waves and humps. In certain cases the use of light oils on tar or asphalt surfaces has softened the original bituminous surface to such an extent as to render the road or pavement unsatisfactory for use.

The author, Professor Blanchard, Columbia University

Defective Construction

From the standpoint of construction, we find failures due both to the use of too small an amount of the bituminous material and an excess of material. Improper application, resulting in uneven distribution, is accountable for many failures of bituminous surfaces, while in other cases a lack of sufficient covering of stone chips or material of a similar character has rendered the surface sticky, mushy, sometimes in the first season, but sometimes not until the second summer.

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* Presented before the American Road Congress at Atlantic City by Arthur H. Blanchard, Professor of Highway Engineering, Columbia University New York City.

There are numerous instances where bituminous surfaces have been adopted under conditions which call for the construction of bituminous concrete pavements or even some type of block pavements. A mat type of construction, which has been employed to a considerable extent, has proved inefficacious in cases where horse drawn vehicle traffic has been more than a certain amount in combination with a motor car traffic which in amount was not sufficient to satisfactorily iron out the calk holes caused by the horse drawn vehicle traffic. There are cases where aesthetics should govern the selection of the type of surface, and generally in such cases the black or brown surface resulting from the use of bituminous material does not harmonize well with the environments.

Bituminous macadam and bituminous gravel pavements are of many types, one of the primary differences in construction being the use of one or two applications of the bituminous material. The efficacy of many of the types depends upon the combinations of sizes of broken stone or gravel and the combinations of bituminous materials used when two applications are employed. Variations in types also exist dependent upon the manner in which the different courses may be filled and the treatment of the filled course prior to the application of the bituminous material. The one application method is very similar in its simplest form to the construction of a bituminous surface except that the bituminous material is applied upon a much more open surface. In the case of the two application methods in certain instances an attempt is made to build up a two course pavement, while in others the second application is in reality used as a seal coat.

Improper Materials

Unfortunately many are the instances where improper bituminous materials have been employed. In some cases the materials were satisfactory in themselves but were used improperly. Many engineers having charge of bituminous work do not appreciate the cold fact that different types of bituminous materials have entirely different physical properties and require entirely different treatment in use, although they may have been purchased under one and the same specification covering chemical and physical properties. In some cases entirely unjustifiable combinations of materials are employed. For instance, one case is in mind where an asphalt of excellent characteristics was used for the first application, while for the second application an asphaltic oil having decidedly solvent and fluxing properties was employed. Overheating of the material has likewise proved the cause of many failures as thus the properties of the materials are sometimes changed and in many cases the materials are ruined.

Under the heading construction, we find failures due to the uneven distribution resulting especially from the improper use of hand pouring pots and hand drawn distributors and also in many cases when horse drawn or power driven distributors are employed. Many unsatisfactory bituminous macadam pavements result from the use of the wrong sizes of broken stone. One instance will be cited where a hard broken stone ranging from [illegible] to [illegible] inches was used for the wearing surface. After rolling, [illegible] gallons of bituminous material was applied and the road finished with a layer of chips. The rapid formation of fine cracks due to the rocking movement of the individual stones under traffic, finally resulting in raveling and general disintegration, is of common occurrence. Segregation of sizes of stone preventing uniform penetration results in weak spots in some cases and "fat" spots in others. In certain cases after a rain the construction has been carried on before the broken stone immediately below the surface has dried out. Many of the causes attributed to the failures of bituminous surfaces may likewise apply to bituminous macadam and bituminous gravel pavements.

Bituminous concrete pavements other than sheet asphalt and pavements laid by companies as proprietary articles have received more attention during the past season than at any time since the days of Abbot, Leverich, Scrimshaw, and Van Camp. Less fear of litigation proceedings and the introduction of economical mixing machines equipped with heating attachments have exerted a marked influence. But, furthermore, the rapidly growing recognition of the inherent advantages of bituminous pavements constructed by the mixing method has been largely instrumental in its adoption for traffic conditions for which it is believed to be economical and suitable.

Constructional Methods

This type of bituminous pavement is constructed usually by one of three methods. These methods, although overlapping to a certain extent, may be described as follows when broken stone is used as an integral part of the mineral aggregate.

Type A consists of so-called one-size crusher run broken stone mixed with bituminous material. It should not be considered that the designation, "one size crusher run stone," means an aggregate composed of broken stone of uniform size. This term as used here refers to the product obtained at a crushing plant which passes over one size of screen holes and through the next larger or passes through a screen of one size of holes and is retained upon a screen having smaller holes. It is evident to those familiar with the operation of crushers that the product thus obtained does not usually consist of stone of uniform size. For example, broken stone commercially designated as "three-quarter inch," used in the vicinity of New York City, is obtained in some cases by passing over ½-in. and through 1¼-in. openings. The size of the stone varies from one inch to one-eighth of an inch. It is self-evident that this variation in size produces a more stable pavement than if the aggregate consisted of broken stone of uniform size. Type A has been constructed by both hand mixing and machine mixing and by using both unheated and heated stone. Many kinds of bituminous materials have been used while in some cases one kind of bituminous material has been used in the mix and another kind for the seal coat; one of the most common combinations being the use of tar in the mix and asphalt for the seal coat.

Type B consists of one size crusher run broken stone and sand or other fine mineral matter mixed together with bituminous material. The wearing surface of this mix is sometimes finished by rolling in fine stone chips but generally a seal coat is used together with fine mineral matter for a top dressing. When constructed on a commercial scale, the mineral aggregate is always heated and mixed in a specially constructed machine. Usually the same grade and type of bituminous material is used for the mix and the seal coat.

Type C consists of a wearing course composed of a graded aggregate of broken stone and sand with or without other mineral matter, which aggregate is mixed after being heated with a bituminous cement in a specially designed machine. As with Type B this pavement is finished with and without seal coats of bituminous material. The Topeka and the Bitulithic pavements may be cited as examples of Type C.

Failures of Bituminous Concrete Pavements

Having reviewed the fundamentals of the various types, consideration will now be given to causes of failure of some bituminous concrete pavements. It should be noted that the percentage of failures of bituminous concrete pavements is much smaller than in the case of bituminous macadam and bituminous gravel pavements.

Poor and unsuitable materials have been accountable or certain failures. Attachment for a material of a certain type has led to a blind adoption of any material belonging to a given class. For instance, in one case coming under the writer's observation, crude coal tar from one gas works had given good results on the average. Based on this fact any crude coal tar was finally used, although those in authority had had an object lesson in a failure due to the haphazard purchase of crude coal tar. Experiments in Rhode Island and in the Borough of Queens seem to have demonstrated that high carbon tar of a certain consistency is not as satisfactory or advisable for a seal coat as some types of asphalts, when the percentage and volume of horse drawn vehicle traffic is large. In some cases an apparent cause of failure has been an excess of flux or of the volatile constituents in asphalt cements. Pavements constructed with such materials many times are wavy due to the movement of the surface under heavy traffic. Many cases are reported where materials have been overheated at the construction site due to the belief that all materials may be and even should be heated to the same temperature before using and that it is impossible to injure bituminous materials by heating to high temperatures.

During construction there are various details which demand careful supervision. Either too large broken stone or stone of too uniform size may cause a failure. Especially is this the case with very hard and tough broken stone. The rocking of the stone causes the formation of fine cracks which eventually lead to disintegration. Naturally the amount and character of the traffic is intimately connected with the condition of the pavement but cases have occurred where failure, even under very light traffic, was due to using large uniform size broken stone for the mineral mix. Poor combinations of sizes of broken stone and sand have resulted in segregation during mixing, transportation or spreading, resulting in a pavement of varying density and stability. Overheating of the mineral aggregate has caused burning of the bituminous material in some instances or the formation of a thin film of bituminous material over the broken stone which is not of sufficient amount to bind the adjacent stones together. The use of a wet aggregate will usually result in a poor mix with consequent unsatisfactory results. In many instances the seal coat has been applied uniformly. The result is either uneconomical due to the necessity of a second application before seventy-five per cent. of the surface requires treatment, or the disintegration of the pavement wherever bare spots occur in pavements where a coarse aggregate was used and where there is considerable horse drawn vehicle traffic. Although of minor import to-day, some failures have been caused by using with unheated stone bituminous cements which will not adhere satisfactorily or which only mix with great difficulty under such conditions.

Many failures are due in both the case of bituminous macadam and bituminous concrete pavements to poor foundations. Sufficient attention has not been paid to this important part of the pavement.

Properties of Materials

Many of the above causes of failure would be eliminated if engineers would devote more time to a consideration of the physical and chemical properties of the materials which they employ. Records should be at hand covering this data and details of the success or failure of every road noted. If a bituminous material laboratory is not connected with the department, it should not be either expensive or difficult to secure certified analyses made by reputable chemical engineers.

In closing the writer wishes to emphasize the fact that a careful consideration of the causes of failure of bituminous surfaces and bituminous pavements constructed during the past five years will result in material benefit, inasmuch as a comprehensive knowledge of the various causes of failure is one of the most valuable assets of engineers having in charge the construction and maintenance of bituminous surfaces and bituminous pavements.

Earth, Sand-Clay and Similar Materials for Roads

By W. S. Keller, State Highway Engineer of Alabama

In spite of efforts to encourage the construction of macadam, gravel and other hard surface roads, there will be of necessity, for years to come, a greater percentage of earth roads in nearly every state. Very few earth roads have, in the true sense, been constructed. The average road is opened without regard to grades or proper location.

In the proper reconstruction of an old earth highway, the road should be carefully gone over by an engineer and changes of a beneficial nature noted, taking into consideration initial cost, maintenance, alignment and grade. The center line and grade of the road should be established. The road should be so graded that when complete it should be uniform in width and surface, with a fall ordinarily of 1 in. per foot from center to gutters. No fixed crown can be established for such roads, owing to the various kinds of earth. Drain pipe should be freely used and no water be allowed to flow over the road if it can be avoided.

Requirements of an Earth Road

In the South there is nearly every kind of soil, from sticky gumbo to coarse sand. The methods used for improvement of one will not do altogether for the other. The worst roads in the South are in rich prairie land, where there is very little building material to be found. This soil readily absorbs water and becomes very sticky after rains. It expands freely and dries rapidly when the sun shines, becoming very hard under the tamping effect of vehicles. These roads require a very high crown and driving surface should only be wide enough to allow two vehicles to pass. If a prairie road is narrow with a fall of not less than 1½ in. to the foot water will shed rapidly to the ditches and the entire surface will dry out quickly. A road of this kind can be constructed quickly and at little expense, except where grades are to be reduced or bottoms are to be filled, using a grading machine or even a split log drag.

The best method of maintaining an earth road, especially a prairie road, is with the systematic use of a split-log drag. A sand road is not good under any circumstances, but certainly is not improved by crowning. It is at its best when moist, and should be left flat. If possible, clay should be added to and mixed with sand, making a sand-clay road.

There are four general ways in which sand-clay roads may be built: (1) Ready mixed sand and clay placed on clay, sand or ordinary foundation; (2) sand and clay placed on soil foundation and mixed; (3) clay hauled on a sand foundation and mixed with sand; (4) sand hauled on a clay foundation and mixed with clay.

Sand-Clay Road Using Natural Mixture

For the first, natural mixture of sand and clay can nearly always be found where the two are found separate. The most important point is to know the natural mixture when seen. The very best guide to this is observation of roads in the immediate vicinity to find a natural piece of good road. A sample taken from the best of this will assist in finding what is required close to the road to be surfaced. This natural mixture can be noticed in any section where red clay and sand are to be found, cropping out usually well up in the hills and having in ditches and cuts the appearance of red sandstone. A real good stratum of well-mixed sand and clay will stand perpendicularly in cuts and ditches, resisting erosion almost as well as sandstone. A test of the best natural sand-clay mixtures will show the sand forms about 70 per cent. of the whole. The test is simple. Take an ordinary medicine glass, measure 2 oz. and wash out the clay. Dry the remaining sand and measuse again in the medicine glass. The theory of the sand-clay mixture as a good road building material is that the clay fills the voids between the grains of sand, firmly binding them together, while the sand forms the wearing surface.

Before placing any sand-clay, the road should be graded to the desired width. A good width for the crown of the road is desirable, say 24 ft., exclusive of side ditches, which are usually about 3 ft. wide each. Sand-clay is cheap and 6 ft. of grade width should be surfaced. This will leave 4 or 5 ft. shoulder on either side. The surface of the graded road should be flat or slightly convex. The sand-clay should be put on from 8 to 12 in. in thickness, depending on the character of the sub-grade. In hard clay, 8 in. will suffice. If the sub-grade is sand, it is well to put on as much as 12 in. After a few hundred feet of surfacing material has been placed, a grading machine should be run over it to smooth and crown the surface before the top becomes hard and resists the cutting of the blade. It is a good plan to turn the blade of the machine so as to trim the edges of the surfaced part, discharging the excess sand and clay on the earth shoulders. After one round trip with the blade turned out, the remaining dress work with the machine should be with blade turned in, with the exception of one trip down the center of road with blades at right angle to the axis of the road for the purpose of distributing any excess of material left in the center.

After the machine work, it is well to follow with a split-log drag, which smooths rough places left by the machine. A sand-clay road, unlike other roads, cannot be finished in a short space of time. It can be left in an apparently finished condition with a hard, smooth surface, but it will be found on close examination that the hard surface is in reality only a crust, underneath which there are several inches of loose material. After the first hard rain, the crust softens, the road gets bad and the work appears to be a failure. This, however, is just what is needed to make it eventually good. After the surface has dried until the mass is in a plastic state, it should be dragged until it is once more smooth with a proper crown and should be kept this way by dragging at least once a day until the sun has baked it hard. The mistake of keeping traffic off during this process should not be made. The tamping of the wheels and hoofs is needed to compact the sand-clay into a homogeneous mass. The ordinary roller is not very effective in this work It would appear that a tamping roller, such as has been used in the construction of oil roads of California, would be very effective. A split log drag is indispensable.

In the second method, sand and clay are placed on a soil foundation and mixed This is necessary where the old road has neither a sand or clay foundation and it is impossible to find the two ingredients ready mixed. The clay should first be placed on the road to a depth of 4 in., and the required width It is not wise to place more than a few hundred lineal feet of clay before the sand is hauled, as the clay rapidly hardens and makes the mixing process difficult After about 100 ft has been placed, the clay should be broken by means of a plow and harrow, and sand to a depth of 6 in. placed on it This should be plowed and harrowed in thoroughly. This is best done immediately following a rain. The traffic aids the mixing and should be encouraged on the road After the mass appears to be well mixed, the road should be properly shaped, as explained. The road should be given attention and should sand or mud holes appear, a second plowing and mixing should be given.

In the third method clay is hauled on a sand foundation and mixed with the sand. The mixing process is similar to that described for the second. Since the foundation is sand, a little more clay will be necessary than where the foundation is of clay or soil.

In the fourth method sand is hauled on a clay fonndation and mixed with clay. The clay foundation should be plowed to a depth of 4 in. and harrowed with a disc or tooth harrow until lumps are thoroughly broken or pulverized. Sand should then be added to a depth of 6 in. and mixed.

Convention of Building Inspectors in Calgary

UPON the invitation of Mayor Mitchell, of Calgary, a convention of building inspectors from all parts of the three western provinces of Canada was held in Calgary on October 24, 25 and 26, for the purpose of considering the drafting and the adoption of a uniform code of building ordinances for use in all towns and cities of Western Canada. The delegates included: Mr. James Findlay, mayor of Vancouver, B.C.; Mr. I. W. Shaw, mayor of Nanaimo, B.C.; Mr. A. E. Young, building inspector, South Vancouver, B.C.; Mr. J. A. Kerr, South Vancouver council; Mr. J. Third, South Vancouver council; Mr. E. Goodwin Jones, building inspector, Moose Jaw; Mr. J. E. Harrison, building inspector, Saskatoon; Mr. O. T. Falls, building inspector, Regina; Mr. L. A. Thornton, Commissioner, Regina; Mr. Thos. Watson, Provincial Sanitary Inspector, Saskatchewan; Mr. Geo. J. Mackie, town engineer, Swift Current, Sask.; Mr. N. A. McIver, building inspector, Edmonton; Mr. H. Wm. Meech, building inspector, Lethbridge; Mr. W. T. Crane, Commissioner, Wetaskin, Alta.; Mr. John Lee, Commissionér, Tofield, Alta.; Mr. H. Mines, Fire Chief, Red Deer, Alta.

The underlying principle of the Code discussed was that it should not be viewed from the standpoint of individual towns or cities, but rather that it should become a Code to be adopted in whole or in part by all towns and cities. A very complete synopsis of the proposed code was drawn up by Mr. Sylvester, the Calgary building inspector, and before the convention various appointed delegates were requested to discuss certain portions in detail. It is hoped that the resulting Uniform Code may be developed to the point of adoption by various cities before the end of another six months. Mr. J. M. Fish, of Calgary, presided at all the meetings of the Convention

Out of this convention has come the formation of the "Institute of Western Canada Civic Building Superintendents." The objects of this Institute will be to further the cause of more efficient and uniform legislation and ordinances for the supervision and control of building construction throughout Western Canada Details as to membership, fees, publications, &c., are to be drawn up by the executive committee. The following officers were elected for the year Honorary Presidents—Mayor Mitchell, of Calgary; Mayor Shaw, of Nanaimo; Mayor McAra, of Regina; Commissioner Chalmers, of Edmonton

First President—Mr. H A Sylvester, of Calgary, Alta. Vice-Presidents—Supt Young, of South Vancouver, Supt Falls, of Regina; Supt Rogers, of Winnipeg; Supt Meech, of Lethbridge

The members of the executive committee are Messrs Jones, of Moose Jaw, McIver, of Edmonton, and Harrison, of Saskatoon The secretary and treasurer is Mr J M Fish, Calgary.

Construction Active at the Capital

Much Interesting Building in Progress—Recent Important Announcements of New Projects—More Contracts for Road Work

OTTAWA

November 2, 1912.

Two foundation stones laid recently in this city are for the Masonic Temple building on Metcalfe St. and for the new Chalmers Church. The former building, which is estimated to cost $90,000, will be five storeys high. The construction is reinforced concrete and brick. The front of the building will be faced with stone.

The Chalmers Church is being built of stone. The cost is estimated at $100,000.

On Bank street the Bank of Ottawa is building a branch building for the Glebe District. The construction is of brick with stone facings. Messrs. Horwood, Taylor & Horwood, of this city, are the architects, and Mr. T. C. James is the contractor. The cost is placed at $20,000.

Building Work at Aylmer, P.Q.

At Aylmer, Que., a few miles out of Ottawa, a number of buildings for the Connaught Racing Association are nearing completion. The official building is constructed of frame and stucco and is finished inside with Beaver Board and fir panelling. This building contains a Royal Reception Room, lounging rooms for members, and the president's office. The grand stand is of steel frame, having an umbrella roof covered with white asbestos roofing. Accommodation is provided under the stand for refreshment room, offices and check rooms.

The Jockey's Building and the Saddling Paddock are both of frame construction, covered with white asbestos roofing. The cost of the buildings is estimated at $75,000. The architect was Mr. W. H. George, of Ottawa.

Jackson-Booth Building

The Jackson-Booth building, now under construction on Sparks street, will be built to a height of eight storeys, instead of five, as originally intended. The building, which is of reinforced concrete construction, is already up to four storeys. The front of the new building will be of Ohio sandstone. The first storey will be faced with marble. Mr. J. A. Ewart, of Ottawa, is the architect.

The Plaza

The Ottawa Electric Railway have commenced laying their tracks on the Plaza and the cars should be running over it in about a week.

There has been a change made in regard to the stone parapet on the south side of the Plaza. Instead of its running to the entrance of the station, as the original drawings showed, it will turn on reaching the western corner of the station and run to the western pier of the building. The entire space from the side of the Plaza to the station will be filled in with prism glass. The parapet wall, which is 4 ft. 6 in. high and of cut sandstone, costs about $50 per ft. The telephone and electric light companies have placed their wires in conduits over the Plaza.

Ottawa and Morrisburg Electric Railway

At the annual meeting of the above line it was decided to commence construction work next May. The proposed line will run from Ottawa to Morrisburg and will take in Leitsein, South Gloucester, Greely, Metcalfe, Ormand, Winchester, Winchester Springs, Williamsburg and Glen Becker. The distance is forty-seven miles. The new president of the line is Mr. J. G. Kilt, and the secretary-treasurer, Mr. R. A. Bishop.

New Artificial Ice Arena

A new artificial ice arena for the Ottawa Arena Company will be built on Isabella street, at the corner of O'Connor street. This building, which will hold fifteen thousand people, will be constructed of concrete, reinforced with steel. Messrs. Ross & McFarlane, of Montreal, are the architects.

New Building of Ottawa Ladies' College

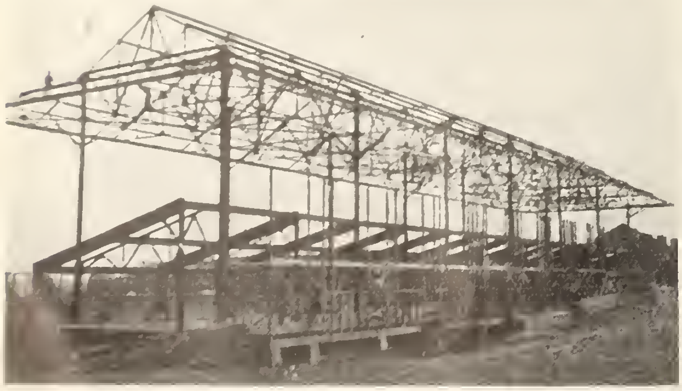
This building will be erected on Lyon street, in the Glebe District of Ottawa. It will be constructed of solid brick, with stone facings and foundations. The estimated cost of the structure is $80,000. Mr. Allan Keefer, of Ottawa, is the architect.

A new wing is contemplated at the Rideau Street General Hospital and also an addition to the Lady Stanley Institute for Nurses. The cost is estimated at $200,000.

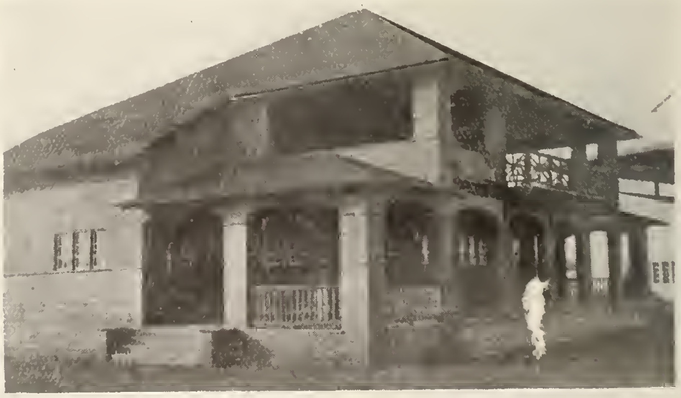
Municipal Works

Four more streets have been let to contractors for asphalt pavements—Powell ave., Nelson street, Arlington ave. and Charlotte street. Two of the contracts go to the Union Construction Company and two to the Ottawa Construction Company. These streets will be commenced immediately the frost is out of the ground.

Two day labor gangs are working on concrete side-



Steel Work of Grand Stand, Aylmer, P. Q.



Official Building, Connaught Park, Aylmer walks at present. Between them they are laying about nine hundred lineal feet of concrete a day. There are about seventy-five men on each gang. L. H.

Canadian Railroad Development

Good progress is being made with the construction of the line from Suffield, Alberta, southwesterly, and it is probable that 55 miles will be completed this year.

The Canadian Northern Railway Company have awarded a contract to Messrs. Murdoch & Company, Vancouver, for forty miles of line from the north end of Cowichan Lake to the Alberni Canal.

Messrs. Moore & Pethick, Victoria, have been awarded the contract for grading a twenty-mile section of the Esquimalt & Nanaimo Railway extension along the east coast of Vancouver Island.

The Toronto and Hamilton Railway Company propose building subways under their line in the neighborhood of Dufferin street, Toronto. They have submitted plans to the Toronto City Council for approval.

Surveys are almost completed for the Grand Trunk Pacific Railway's new line which will run south and west from Regina. This line is intended ultimately to constitute a southern main line through to the coast.

It is expected that both the Canadian Pacific and Canadian Northern Railways will require no less than 200,000 tons of steel rails during the coming year. This means that each railway will be laying no less than 1,800 miles of steel.

The Canadian Northern Railway Company has filed, with the city of Toronto, its plan for the proposed eastern branch through York and Scarboro townships. It will run parallel to the C. P. R. from near Yonge street to Leaside Junction, and then in a south-easterly direction through the township of Scarboro.

Bids were opened on October 10th, by Mr. H. E. Beasley, General Superintendent, Esquimalt & Nanaimo Railway, Victoria, B.C., for supplying 50,000 railway track ties, and distributing the same on the grade of the Comox Extension of the Esquimalt & Nanaimo Railway from McBride Junction to Big Qualicum River.

The new coal handling plant of the Canadian Pacific Railway Company at the mouth of the McKellar River, Fort William, is now ready for operation. This plant is said to be the largest of its kind in the world. It has been constructed at a cost of $2,000,000 It is capable of unloading 10,000 tons of coal from a vessel in ten hours.

The Vancouver, Victoria & Eastern Railway & Navigation Company have awarded contracts to Messrs. Guthrie, McDougall & Company, of Portland, Ore., and St. Paul, Minn., for forty-two miles from Coalmont, B.C., to the summit of the Hope Mountains at the head of the Coquihalla River. This leaves a gap of 37 miles between that point and Hope, B.C., to be let at a future date to complete the V., V. & E. Ry. between Laurier, Wash., and the coast

Messrs. Mackenzie, Mann & Company, Limited, 719 Metropolitan Bldg., Vancouver, B.C., opened bids recently on the clearing, grubbing, grading, bridging, etc., for the Okanogan branches of the Canadian Northern Pacific Railway, extending from Kamloops, B.C., to Vernon, Kalowna and Lumby, B.C., a total distance of 131 miles. The contracts are to be let in two divisions Kelowna to Vernon and Lumby, 48 miles, and Vernon to Kamloops, 83 miles

The C. N. R. at Montreal

The Canadian Northern Railway will build some large freight sheds in Montreal. These will extend over two blocks between Haymarket Square and Brennan street, and laterally will cover all the space lying between Dalhousie and Nazareth streets. A viaduct from the central station at Lagauchetiere street, to be erected in connection with the Mount Royal tunnel scheme, will enter the second storey of the freight sheds, the tracks spreading fanwise throughout the building. All trains will be unloaded here, and the city freight will be sent to the floor below ready to be despatched to its destination in that city.

According to a statement by Sir Donald D. Mann the tunnel is now opened over 1,000 feet from the west side, the two hundred men making progress at the rate of one hundred feet per week; while from the south end the rate is ninety feet per week. The engineers have been working in solid rock almost since they began operations, or at least fifty feet from the mouth of the tunnel. The material is a kind of limestone. Once through the mountain it was stated that they would begin to "stope," knocking down the stone from the sides and top and making a tunnel 28 feet wide and 22 feet high, which will be lined with concrete and lighted by electric light throughout. During the process of "stoping" it is estimated that twice the number of men can be put to work as now employed, and the engineers agree that by the last day of 1913 carts can be driven through the interior of the mountain from Lagauchetiere street to the western portal beyond the C. P. R. track. The Maple avenue shaft is also down to a depth of 238 feet, consequently work will be proceeding both ways, and it is hoped that the completion of the tunnel will be brought about several months before the time specified when the first calculations were made.

In speaking of the progress of the work on the line around the north of Lake Superior, Sir Donald computed that 44 per cent. of the work was now completed between Montreal and the head of Lake Superior. There was, he said, a total trackage laid of 220 miles, and by the end of the present year 460 miles will have been completed out of the one thousand miles. By the ent of 1913 freight trains will be running over the road and regular passenger trains one year later. Good progress, he also stated, had been made on the grading between Sudbury and Port Arthur, where 46 per cent. has been completed.

Papers at the Canadian Highway Convention

Among those who contributed papers at the recent Winnipeg convention of the Canadian Highway Association were Mr. James Weidman, of Keewatin, on "The Canadian Highway from Winnipeg to the Lake of the Woods and beyond;" Mr. A. J. McPherson, Provincial Highway Commissioner of Saskatchewan, on "The Roads of Saskatchewan;" Mr. Joseph Maw, of Winnipeg, on "The Rule of the Road;" Mr. A. C. Emmett, of Winnipeg, on "Accurate Road Maps;" Major Count de Bury, representing the Department of Militia and Defence, on "Highways from a Military Point of View;" Mr Charles F. Roland, Winnipeg's Industrial Commissioner, on "The Canadian Highway as an Advertising Medium;" Col. G. W. Bennett, Provincial Superintendent of Colonization Roads in Ontario, on "The Roads of Ontario;" Mr. S. R. Henderson, President of the Manitoba Good Roads Association, on "The Use of the Split-log Drag;" Mr. A. P. McGillivray, Provincial Highway Commissioner of Manitoba, on "The Roads of Manitoba." Several other papers, including one on "Convict Labor on Roads," which had been prepared by members who found themselves unable to attend the convention, were also read and discussed. A report of the meeting was published in our issue of Oct. 23

Winnipeg—the City of Building Records

Operations in Full Swing with Close of Season Approaching—Detailed Description of Farmer's Advocate Building

Winnipeg, November 1, 1912

BUILDING operations are being rushed to completion as the approaching winter season draws near. The great majority of recent permits are for houses. There will be double the number of houses built this year than in any previous year since records were kept. The number built in districts adjacent to but outside the city limits and not included in the permit records will also be much greater this year than in any previous year.

Excellent progress is being made by the Carter-Halls-Aldinger Company with the new office building for the Winnipeg Electric Company on Notre Dame avenue. The steel work is up for ten storeys.

The new warehouse building of the Manitoba Cold Storage Company, on Higgins avenue, is one of the large reinforced concrete buildings of the year. This building is 111 ft. by 150 ft. and will be seven storeys high and have 1,200,000 cubic feet of storage capacity.

Messrs Brown & Ruderford are putting up a new reinforced concrete factory building on the banks of the Red River, near Louise Bridge, to replace their planing mill which was totally destroyed by fire last April.

Constructional view Farmer's Advocate Building.

Farmer's Advocate Building

The illustration shows the Farmer's Advocate Building, which is being erected on Notre Dame avenue, between Longside and McMichen streets. This building is being constructed on the Kahn system for reinforced concrete. It has a frontage of 41 ft. 9 in. on Notre Dame avenue and runs back 198 ft. 6 in. At the rear there is a wing extending 50 ft. towards Longside street.

The footings and basement walls are of concrete. The basement walls were given a heavy coat of pitch, applied hot, thoroughly covering the concrete from the footings to the grade level. The basement walls are from 1 ft. 4 in. to 1 ft. 8 in. thick, and from grade to the level of the first floor, a distance of 7 ft., the walls are of Tyndall stone. The building is five storeys high above ground, the basement being taken up by the press rooms, boiler room, etc.

There will be installed two tubular boilers, 52 in. x 14 ft. 0 in. Massive concrete footings were built for the presses. The first floor contains the general offices and composing rooms and the remaining floors will be rented for office purposes.

The front of the building on Notre Dame avenue will be faced with Waite Fullerton buff speckled Norman brick and the remainder of the building with Aslip sandstone brick. The cornice is cut Tyndall stone and all the window sills are stone, with brick arch lintels.

All cement used in the building was tested to following requirements: specific gravity to be 31. All should pass through a No. 50 sieve and should leave a residue of not more than 7 per cent. on a No. 100 sieve and not more than 22 per cent. on a No. 200. It should develop initial set in not less than 40 minutes and a hard set in not less than two hours and not more than ten hours.

The mixture of the cement was as follows: for slabs, beams and walling, one part Portland cement, two parts of sand, four parts of broken stone or screened gravel; for columns, one part Portland cement to 1½ parts sand to 3 parts broken stone or screened gravel; for footings, one part cement to six parts unscreened gravel.

The floors are finished to an absolutely level surface with a finishing coat of minimum thickness one inch made up as follows: the lower half one part sand to two parts cement and the upper half two parts sand to one part of a mixture of cement and "Master Builders" filler or "Ironite," made up in the proportions of 25 lbs. of "Ironite" to 100 lbs. of cement. The floor and roof slabs are of hollow "Floor Tyle" construction.

At the main entrance from Notre Dame avenue there is a reinforced concrete stair to two steps above the level of the first floor. The treads are white Italian marble 1¼ in. thick and the risers green Missisquoi marble, ⅞ in. thick. The stairs in the remaining portion of the building are structural steel and chequer plate. A freight elevator is to be installed. The walls of the elevator lobby entry at Notre Dame will have ⅞ in. marble wainscotting 6 ft. high and the floors of this portion will be marble mosaic.

Mr. H. E. Matthews is the architect and the Lyall Mitchell Company are the general contractors.

Skilled Labor Scarce

In the labor field we find bricklayers extremely scarce and commanding high wages. The demand for rough carpenters is falling off as most of the buildings have their exterior work completed. Teams are very hard to secure, as much as $8 a day having been paid for a man and team.

—L.R.M.

The total mileage of railways electrically operated in Canada on June 30th, 1911, was 1,224 miles. The number of miles added during the year ended June 30th, 1911, was 175. The total number of electric light companies operating in 1911 is given as 418, of which 228 are in Ontario. The number of lamps used is 23,530 arcs and 3,736,160 incandescents. The amount of electrical energy produced for export and for home consumption under the authority of the Electricity and Fluid Exportation Act for the year ended March 31st, 1911, was 793,162,316 units, the largest producer being the Ontario Power Company, of Niagara Falls, with 325,969,900 units. The total number of telephone companies on the same date was 537. The total number of miles of wire is given as 687,728, made up of 576,713 urban and 111,015 rural. The number of telephones in use was 302,759. The number of miles of telegraph land lines operated by the Dominion Government is 8,150 and of cable 256 miles. The numbers of miles of land lines operated by the various provinces are: Newfoundland, 14; Nova Scotia, 766; New Brunswick, 78; Quebec, 2,120; Ontario 28; North-West Provinces, 1,376; British Columbia, 1,156; Yukon, 2,612. In addition to the Government lines, there are nine companies operating as follows:—The Great North-Western Telegraph Company, 10,726 miles of line and 50,568 miles of wire; the Canadian Pacific Railway Company, 13,386 miles of line, comprising 87,703 miles of wire; the Western Union, 2,598 miles of line and 11,599 miles of wire; the Temiskaming and Northern Ontario Railway, 294 miles and 3,299 miles respectively; the Algoma Central Railway, 214 and 517 miles; the Grand Trunk Pacific Railway, 1,963 and 6,004 miles; the North American Telegraph Company, 44 and 783 miles; the Canadian Northern Railway Company, 4,367 and 13,073 miles; and the Transcontinental Railway, 313 miles of line.

Irrigation in Canada

AT the recent annual meeting of the British Association for the Advancement of Science, at Dundee, **Scotland, a paper on irrigation in Canada was** read by Sir Wm. Willcocks before the geographical section. The "London Times" gives the following report of Sir William's paper:

"He said that irrigation and marriage went together. Children and prosperity kissed each other. Children in towns were a source of expense, but on irrigated farms they were a source of wealth. Either Mormonism made Brigham Young turn his thoughts to irrigation, or irrigation turned him to Mormonism. (Laughter). Where all the laborers were members of the family there were no strikes, such as were so common here.

"Young unmarried men had not, as a rule, been a success on farms. 'It is not good for man to be alone' was as true on a farm to-day as it was in Eden. The Garden of Eden was an irrigated farm, with alfalfa, fruit trees, and cattle, just as in irrigated Canada, and irrigated Canada would be claimed as the Garden of Eden but for the Fall. (Laughter).

"If the money spent on expensive schools for boys and girls were put by as dowries for the girls, and the boys were taught practical farming and then married to the girls and sent to Canadian farms with a moderate capital, there would no longer be the sight of young men hanging about for odd jobs, with all the professions crowded out and so many militant suffragists making Britain the laughing stock of the world. The suffragist worry was the price which had to be paid for spending so much money on extravagant and painful education for boys, while girls had no dowries provided for them.

"Shakespeare was right when he wrote:

'earthlier happy is the rose distill'd
Than that which, withering on the virgin thorn,
Grows, lives and dies in single blessedness.'

"These dowerless women were not earthly happy, they could not be distilled; and they had made up their minds to distill mankind. (Laughter)

"He expressed great hopefulness with regard to the future of irrigated Canada, though he thought the people there, like true sons of a shop-keeping nation, rather over-advertised their attractions. Napoleon had saved this country from that spirit one hundred years ago, and he thanked God that the German navy was rising into power, and that, when really formidable, it would ween Canada, as well as the people of this country, from the harlot spirit in commerce against which Isaiah pronounced his bitterest woe, and which was capable, above all others, of making a nation lose that "title of respect which the proud man ne'er pays but to the proud.'"

Mainly Constructional

The News in Brief—From the Atlantic to the Pacific.

The City Engineer's office at Calgary is vacant owing to the resignation of Mr. J. T. Child.

Toronto is to have a new Veterinary College on Anderson street. The Government is building this at a cost of $200,000.

It is estimated that the widening of Terauley street, Toronto, to 86 feet will cost $1,500,000. The city council will report on the matter.

The Board of Education of Fort William, Ont., has decided to ask for competitive plans for all new school buildings to be erected in the future.

An increase of nearly 2,500 cars of grain from October the first to date, arriving at Fort William, is shown over last year's figures for the same period.

It is expected that a contract will soon be awarded for the second and third units of the jetty work on the Fraser River, B.C. The estimated cost is about $1,500,000.

A deputation of prominent citizens will wait upon the next meeting of the Board of Control, Ottawa, to ask for the appointment of an inspector of roads and streets.

The Pacific and Great Eastern, the Vancouver to Fort George Railway, has purchased the Howe Sound and Northern Railway and its properties. The sum of one million dollars is involved.

The Good Roads Commission has decided to secure a staff of men to maintain the ten good roads in the Toronto system. The cost is provided for in a maintenance fund voted by the city and county.

In a recent speech at Revelstoke, B.C., Sir Richard McBride stated that the Minister of Works would continue to carry out a progressive campaign for good roads next year which would entail large expenditures.

The Department of the Interior of the Dominion Government has decided to prolong navigation on the Great Lakes by an additional month. Arrangements for ice breakers at Fort William have already been made.

It is expected that the building permits issued during October in Vancouver will total almost $3,000,000. This will be the highest figure yet reached in this city, the present record being for May, 1911, which was $2,188,050.

The annual report of Mr. Newton J. Ker, City Engineer of Ottawa, has just been issued. The main features of the report were incorporated, in a special article on the development of the Federal Capital, published in our issue of Oct. 2.

The new Winnipeg premises of the Canadian Bank of Commerce, detailed reference to which has been made in previous issues of this journal, was opened recently. The building is six storeys high, with basement and sub-basement.

The Montreal Board of Trade have expressed strong dissent from a proposal by the city council to repeal the by-law by which the cost of street paving is paid by the proprietors. The council desire that the city shall pay for the paving.

Work is being steadily carried on with the new Agricultural College at St. Vital. The cost of the institution when completed, which will not be for two or three years, will be over $5,000,000. Contracts have already been let for about half of this sum.

Maisonneuve, P.Q., is anxious to secure part of any contribution that Canada might make towards the British navy, and a petition to the Government has been signed asking that any vessels that may be constructed shall be built at the yards and dry dock established there by Vickers, Ltd.

A new road treatment, "Oilcrete," is being experimented with at Point Grey, B.C. It is an asphaltic treatment which, it is claimed, makes a firm, elastic roadway, and leaves a beautifully smooth surface. It is said that it will add years to the life of the roads, and will do away with the dust nuisance.

The estimates which Mr. Geo. T. Clark, City Engineer of Saskatoon, Sask., submitted to the city council for the year 1913, have been practically reduced by one-half. The sum which the council allowed for expenditure is $666,000, which includes amounts for pavements, sewers, sidewalks, and storm sewers.

The Union of Municipalities of New Brunswick has again requested the Government of that province to appoint a provincial officer to devote his whole time to highways. At a recent representative meeting in St. John some of the speakers suggested raising $150,000 to $200,000 by bond issue for permanent trunk road construction.

Work is expected to be started very shortly on the breakwater at Ogden Point, Victoria, B.C. The work about to be inaugurated will give employment to hundreds of laborers, will mean an expenditure of many thousands of dollars in the city of Victoria and will develop the port on a scale commensurate with the important position which it occupies.

The following companies have been incorporated to carry on business as builders, etc., with head offices at Toronto: Monarch Construction and Realty Company, Limited, capital $40,000; Abingdon Realty Company, Limited, capital $100,000; East Melfort Investors, Limited, capital $36,000; City Investments, Limited, capital $100,000; Central Corners, Limited, capital $260,000.

The Tregillus Clay Products Company, Calgary, expect to start producing brick in two or three weeks. All classes of brick, tile, and sewer pipe are to be manufactured at this plant, and about 250 men will be employed at the commencement. The plant is equipped with the very latest machinery and there is an abundance of clay for manufacturing purposes. Approximately one million dollars has been invested in this proposition.

Great activity is being experienced in building operations in Winnipeg and the vicinity. Just recently permits were taken out by one firm alone for ten houses costing $50,000. A much better class of residence generally is now being erected than was formerly the case; in fact there is quite a dearth of six-roomed houses. A real estate deal took place recently in which as high as $3,500 a foot was paid on Portage avenue, eight and one-half blocks west of Main street. It is expected that building permits will exceed the $20,000,000 mark before the end of the year.

Errata

In an article published on page 68 of our issue of October 16 we referred to the Doty Engine Works Company, Limited, of Goderich, Ont. This firm is now known as the Doty Marine Engine & Boiler Company, Limited.

Under the heading of Waterworks, Sewerage and Roadways in the Contracts Department of our issue of September 25, 1912, the Canada Cement Company were inadvertently named as the contractors for paving work at Peterborough. The road was built by the city and confusion arose out of the fact that Canada cement was used.

Personal Mention

Mr. C. Durban, of the Main Drainage Department at Toronto, has been appointed Assistant City Engineer of London, Ont.

Mr. R. W. Brock, Director of the Geological Survey, Ottawa, attended the recent meeting of the Canadian Mining Institute, held at Victoria, B.C.

Mr. Harry Angus, consulting engineer, Toronto, has now become identified with the Canadian Domestic Engineering Company, at their Toronto office.

Mr. L. O. Beam, formerly inspector with the Public Works Department of the province of Saskatchewan, has become identified with the R. J. Lecky Company, contractors, of Regina.

Mr. R. E. Chadwick

Mr. Alexander Allaire, until recently manager for the Foundation Company, Limited, at Montreal, has been appointed manager for western Canada with headquarters at Winnipeg. He has been in charge of the company's business at Montreal since that office was opened two years ago. Mr. R. E. Chadwick, who has been assistant to Mr. Allaire, succeeds him as manager for eastern Canada. Mr. Chadwick was formerly Bridge Engineer for the city of Toronto. He resigned to accept a position with the Foundation Company as superintendent on the 55-storey Woolworth Building in New York City.

Mr. Philip C. B. Harvey, of Calgary, has been appointed superintendent of Dominion parks, with headquarters at Edmonton. He was formerly engaged in irrigation work with the Canadian Pacific Railway.

Mr. A. Chausse, superintendent of buildings, Montreal, leaves to-morrow (Nov. 7) for Dallas, Texas, to attend the convention of the American Municipal Improvement Association, to be held on Nov. 12-15.

Dr. McCullough, Provincial Health Officer for Ontario, recently told a deputation from Kingston, Ont., that within four years sewage disposal plants would be compulsory in Ontario for places situated on the lakes.

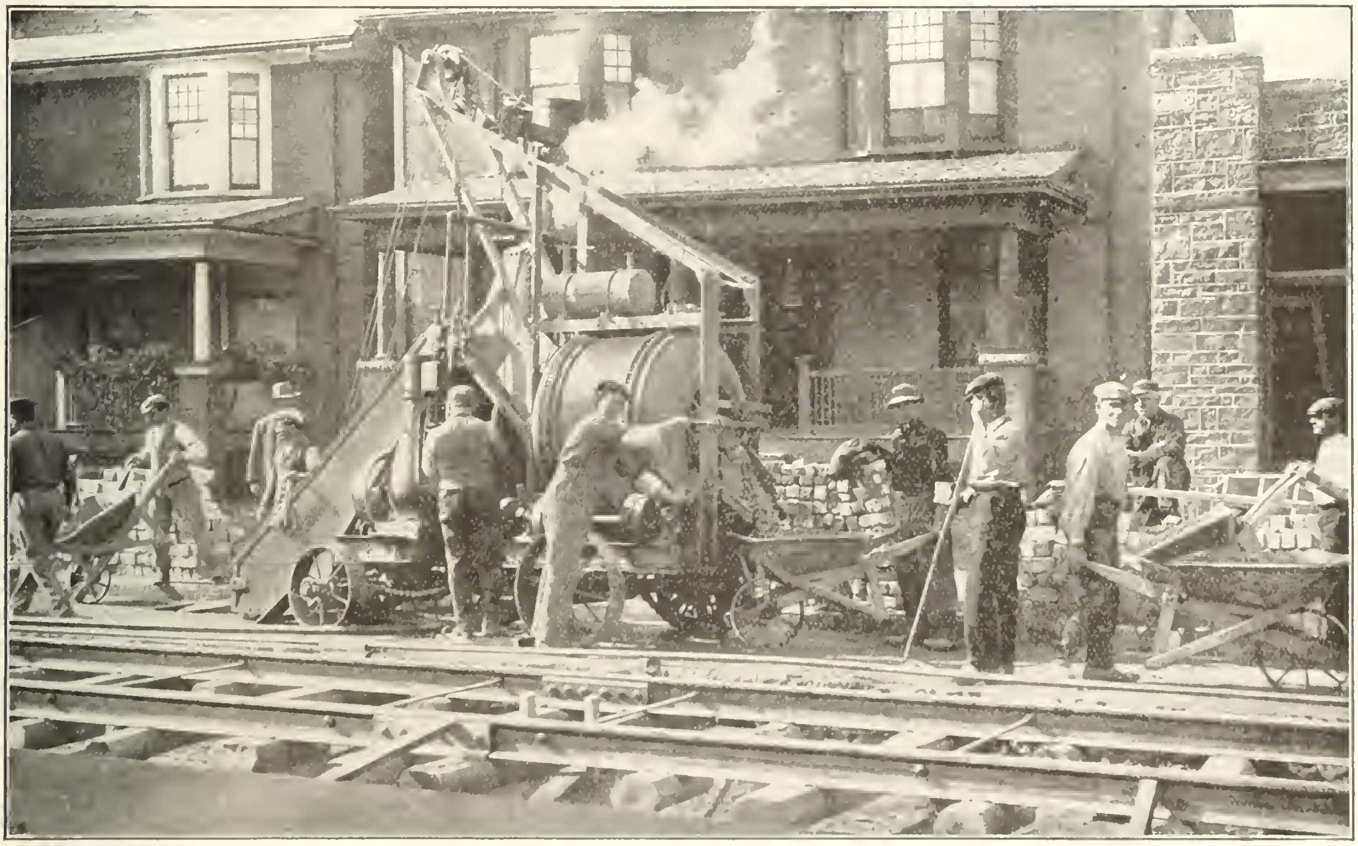
Mr. R. O. Wynne-Roberts, Regina, has been investigating the lignite coal fields of Saskatchewan, in order to ascertain the feasibility of the generation of power and the distribution of it throughout the southern part of the province.

Mr. M. J. Butler, C.M.G., who has been connected with the Dominion Steel Corporation since its organization, in

1910, has resigned the position of general manager. Mr. Butler was well known as Deputy Minister and Chief Engineer in the Department of Railways and Canals at Ottawa, in 1908.

At the Convention of the Canadian Printers' Cost Convention, held in Montreal, Mr. L. S. Bruner, Manager of Publicity, Canada Cement Company, and Mr. L. C. Randolph, Advertising Manager, Canadian Fairbanks-Morse Company, spoke on "Application of a Cost System from a Customer's Standpoint."

After a brief illness, the death took place in Victoria recently of Mr. Edward Mohun, one of the oldest and best known civil engineers in British Columbia. The deceased gentleman was 74 years old, and had been engaged in engineering in that province for nearly fifty years, working principally for the government. Mr. Mohun was the author of many engineering papers and tables. He was a member of the Canadian Society of Civil Engineers and of the American Society of Civil Engineers.



Placing concrete on foundation for civic car lines, at Dundas Street, Toronto.

A Record in Concrete Mixing

Critics who allege slow progress upon public works should take a trip to Dundas street, where the Works Department is putting in right-of-way for the Toronto Railway Company's tracks. Seven hundred bags of cement, each weighing over 87 pounds were put through the concrete mixer. It was also fed four cars of broken stone. Approximately 235 tons of concrete came out of the other end, and were laid in the roadway. This all happened in a working day of 540 minutes, so that about one ton of concrete was made, handled, and put in place every 2 1/3 minutes. The 235 tons of concrete measured 175 cubic yards. In other words, it would have formed a pillar five feet square and 189 feet high—far higher than the Lumsden Building. The work is being done, not by contractors, but by city employees, using a Koehring No. 14 street mixer, made by the Canada Foundry Company, Limited.

For the first time in Canada, the "Metropolitan" system of floor construction will be used in the Sauvegarde Building, Montreal, now being built by Mr. C. E. Deakin, to the plans of Messrs. Saxe & Archibald. The system, which has been in use in the United States for many years, consists of a reinforcing of No. 12 steel wires and a floor slab composed of pure Nova Scotia gypsum, no cement or concrete being used. As the forms can be removed within twelve hours after the floors are poured, the system permits a very rapid construction. The owners are the Keystone Fireproofing Company, of New York City. Messrs. Douglas-Milligan, Limited, of Montreal, are the Canadian sales agents.

"Incineration and Incinerators" is an informative booklet issued from the offices of the Standard Ideal Co., Ltd., of Port Hope, Ont., which deals with the sanitary disposal of waste matter in the absence of sewer systems. Its pages are devoted to the illustrated description of the various types of Standard Ideal incinerators. The advantages of these installations from the standpoints of sanitation and convenience should appeal strongly to those who have discovered the evils of the cesspool. In this booklet, Dr. Bashore, formerly of the Pennsylvania State Board of Health, is quoted as saying of the cesspool: "It is a relic of mediaeval shiftlessness and carelessness for which no excuse can be offered."

Please notify the publishers if the Contract Record does not reach you promptly.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Calgary, Alta.
Pipe line to cost $90,000. Clerk, M. Miller. Engineer, J. T. Child. By-law passed for extension to gravity water pipe line.

Galt, Ont.
Road improvements planned to cost $75,000. Clerk, Jos. McCartney. Reeve, Mr. Jaffray. Ratepayers will vote on by-law Nov. 21st.

Ottawa, Ont.
Watermains to cost $13,000 (Heneley and Forward); are under consideration of city council. Engineer, N. J. Ker.

Peterboro, Ont.
Our previous report stating the contract for construction of pavements has been awarded to Canada Cement Company, of Montreal, was an error. This work was done by the city of Peterboro with cement supplied by the above company. T. A. S. Hay, engineer.

Pointe Claire, Que.
The town have annexed Valvis and Lakeside and are providing for a loan of $100,000 to make improvements. This will include sewers, water and electric lighting, pavements and sidewalks. Mayor, J. T. McBride.

Winnipeg, Man.
Gate valves—25 thirty-six inch for waterworks. Tenders received by secretary, M. Peterson, until Nov. 8. Engineer, H. N. Ruttan, 223 James avenue.

CONTRACTS AWARDED

Hamilton, Ont.
Watermains on Balsam ave. from Main to Elm st., 6-in., $360, and on Whitfield ave., Stipes Lane to Trolley street, 6-in., $1,096. City will do work.

Sewers on Fraser avenue, Campbell avenue to Edinburgh avenue; S. Cheeseman, King and Dundurn streets, $1,000; sewer on Cedar avenue from Central avenue to Cumberland avenue; A. F. Macallum, $793.

Macadam roadways to cost $5,000. Mayor, Geo. H. Lees. Engineer, A. F. Macallum. Civic Works Dept. will construct macadam roadway on Barton St. from Ottawa to Kenilworth avenue.

Hanover, Ont.
Concrete sidewalks, 16,000 sq. ft. Clerk, John Taylor. General contractor, Perth Contract Co., Stratford.

Quebec, Que.
Cast iron pipe. Waterworks engineer, J Gallagher. Engineer in charge, W. Baillarge. General contractor, Iron Corporation, Ltd., Mark Fisher Bldg., $[illegible]0 per ton.

St. John, N.B.
Sewer on Union street between Charlotte and Carmarthen; concrete and terra cotta. Clerk, H. E. Wardroper. Commissioner Water & Sewerage, R. Wigmore. Engineer, Wm. Murdock. General contractor, Fred. Nice, 20 King St. west.

Railroads, Bridges and Wharves

Belmont, Ont.
The C. P. Ry. Co. have been authorized to construct spur for the Canadian Milk Products Co. Ltd., near Belmont Station.

Ft. William, Ont.
Station to cost $20,000, for Canadian Northern Railway, Winnipeg. Chief Engineer, W. M. McLeod, Winnipeg. Architect, R. B. Pratt, Union Station, Winnipeg, is preparing plans.

Kearney, Ont.
Grand Trunk Railway Company have been authorized to construct siding and spurs therefrom for the Shortreed Lumber Company.

London, Ont.
Steel bridge to cost $10,000 planned by city council. Engineer, Geo. W. Wright. Ratepayers to vote on by-law in January.

Port Mann, B.C.
Railway shops for Canadian Northern Railway. General manager, T. G. Holt. Work will start shortly on large roundhouse, machine and repair shops, boiler works, storehouses, lumber sheds, etc. It is intended to manufacture everything except wheels and axles.

St. Catharines, Ont.
The Niagara, St. Catharines & Toronto Railway plan extension to their line to Niagara-on-the-Lake from St. Catharines.

St. Martin Jct., Que.
Canadian Pacific Railway Company has been authorized to construct spur for Paquette & Gauthier at St. Martin Jct., Co. Laval, Que.

Twin Elm, Ont., Twp. Nepean
C. N. O. Ry. Company's location of station has been approved and plans will be prepared.

Vancouver, B.C.
Ferry and subway station at the Columbia avenue pier. Tenders will be called when plans are approved by Bd. of Railway Commissioners. Sec., W. McQueen. Engineer, F. Fellowes.

CONTRACTS AWARDED

Bonshaw, P.E.I.
Bridge. Prov. Govt. Dept. of Public Works. Sec. Public Works, L. B. McMillan, Charlottetown. Engineer, H. H. Shaw, Charlottetown. Steel work, W. P. McNeill & Co., New Glasgow, N.S. Work on substructure to be done by day labor under supervision of engineer; to start Nov. 10th; 60 ft. steel span, substructure, creosoted piling.

Dunk River, P.E.I.
Bridge to cost $2,500. Prov. Govt. Department of Public Works. Sec. Public Works, L. B. McMillan, Charlottetown. Engineer, H. H. Shaw, Charlottetown. Steel work, W. P. McNeill & Co., New Glasgow, N.S. Work on substructure to be done by day labor under supervision of engineer, to start Nov. 1st; steel span, 90 ft. long, concrete piers.

Fairhaven, Deer Island, N.B.
Pier head to cost $5,750. Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, C. A. Huntley, Parrsboro, N.S.

Grand Forks, B.C.
Bridge to cost $80,000, for C. P. Ry. Engineer, E. B. Skeele. Steel work, Hamilton Bridge Co., Hamilton, Ont. Bridge across big canyon on Granby spur, 350 ft. long, 125 ft. high, 1 large span and 2 smaller ones supported by large stone piers. Steel work is started.

Depot, round house, machine shop, etc. for C. P. R. Engineer in charge, E. B. Skeals. Walls started in machine and repair shops. Foundation started on roundhouse. Depot will not likely be started till spring. New up-to-date equipment only will be required for equipment of machine shops.

Mitchell, Ont.
Messrs. A. Hill & Co., Main street, have secured contracts for the erection of a number of cement and stone bridges in the district. A large quantity of supplies required.

Seal River, P.E.I.
Steel bridge to cost $3,200; 130 ft. span, to be built on creosoted piles. Provincial Govt. Dept. Public Works. Sec. Public Works, L. B. McMillan, Charlottetown. Steel work, W. P. McNeill & Co., New Glasgow, N.S. Work on sub-structure to be done by day labor under supervision of engineer H. H. Shaw, Charlottetown.

Tignish, P.E.I.
2 bridges; steel spans each 35 ft. long, creosote piers. Work to start at once. Prov. Govt. Dept. of Public Works. Secretary Public Works, L. B. McMillan, Charlottetown. Engineer, H. H. Shaw, Charlottetown. General contractor, W. P. McNeill & Co., New Glasgow, N.S.

Toronto, Ont.
Subway, Avenue road, for C. P. Ry. Engineer Grade Separation, B. Ripley, 260 Avenue road. General contractors, Jennings & Ross, Ltd., King street w.

Public Building, Churches, Schools, etc.

Barrie, Ont.

High school. The Board has decided to ask architects Stewart & Witton, 2 Hughson street S., Hamilton, to prepare plans for alterations to school, to be less elaborate than former ones, and cost about $45,000. Tenders will be called as soon as plans are ready. Secretary, F. Marr.

Bridgeburg, Ont.

Town hall to cost $25,000, 2 storeys. The reeve has been instructed to ask for plans. Clerk, R. A. Lamb.

Cochrane, Ont.

Hospital to cost $50,000. Clerk, S. L. Bradley. The T. & N. O. Ry. have given town a free site and plans will be prepared shortly.

Elmira, Ont.

Post office planned, 132 x 66, Arthur street. Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Plans and specifications to be prepared shortly.

Fort Qu'Appelle, Sask.

Sanitarium , for Provincial Government. Commissioner of Public Health, M. M. Seymour, M.D., Regina. Architect, J. H. Puntin, Regina. Brick and concrete construction. Plans prepared.

Montreal, Que.

Curling rink. Architects, Peden & McLaren, 20 St. Alexis street, are preparing plans and tenders will be called shortly.

Ottawa, Ont.

Laboratory for City Bacteriologist. Site is being looked for and plans will be prepared. Clerk, Jno. Henderson.

Arena, Preston street, for Ottawa Stadium Co. President, Frank Ahearn. Architect, Thos. Hooper, 739 Hastings W., Vancouver, B.C., is preparing plans.

Penticton, B.C.

School to cost $60,000, Main and Jermyn streets, for Public School Board. 2 storeys, Okanogan Valley brick construction trimmed with concrete; 8 class rooms, library and assembly hall, ventilating and heating systems. By-law carried and work will start as soon as possible.

St. Catharines, Ont.

Fire hall to cost $6,000, Lake and Albert streets. Architect, A. E. Nicholson is preparing plans. Contract will not be awarded until 1913.

St. Pierre Aux Liens, Que.

Fire station. Architect, Viau & Venne, 76 St. Gabriel street, Montreal. Tenders received by secretary-treasurer P. O. Hamel, Jr., until 8 p.m. Nov. 30th Stone foundation and brick construction

Thorold, Ont.

Post Office for Dominion Government, Dept. of Public Works. Secretary, R. C. Desrochers. Plans in progress.

Toronto, Ont.

Police station planned Mayor, H. C. Hocken. Architect, Mr. Woolnough, City Hall. Site has been secured at New street and Davenport road.

Vancouver, B.C.

School planned by Provincial Govt., Dept. of Public Works. 2-sty., frame construction. Plans and specifications at Dept. and with T. W. Herne, Fort George. Tenders received by Dept. until Nov. 20.

CONTRACTS AWARDED

Guelph, Ont.

Field Husbandry Bldg., cost $40,000. Agricultural College, Provincial Government, Dept. of Public Works, Toronto. General contractors, P. H. Secord & Sons, Ltd., Brantford. 2½ storeys and basement, 146 x 69, stone foundation, pressed brick construction.

Hamilton, Ont.

Addition to Club House to cost $3,200 for Daughters of the Empire. Regent, Mrs. P. D. Crerar, James street S. Carpenter, J. Poag & Co., Westinghouse avenue. Masonry, R. Isbister, 125 Wellington street S.

Lethbridge, Alta.

Citadel to cost $12,000, for The Salvation Army. General contractor, E. T. Broard, 7th avenue S. 2-sty., 36 x 70, cement foundation, pressed brick construction. Excavation started.

Stratford, Ont.

Salvation Army Barracks, Ontario St. Secretary, J. A. Fletcher. Architect, Major Miller, Toronto. General contractors, Pounder Bros., care architect. Electric lighting, steam heating, seats and office equipment required.

St. Boniface, Man.

School, Cathedral street. Norwood. Architect, J. A. Hudon, 608 Builders' Exchange, Winnipeg. General contractor, J. Benoit, 114 La Verandye street, St. Boniface. Stone foundation, stone and brick construction, 92 x 49.

St. Catharines, Ont.

Alterations to fire hall to cost $6,000, St. Paul street. Architect, Thomas Wiley. Mason, Jos. Stevens. Carpenter, H. Wilson. 2-sty., stone foundation, brick construction.

Toronto, Ont.

Schools. The Board of Education have awarded the Terra Cotta Fireproofing contracts of the following four schools to Robert Bennett, contractor, Kingston road: Strathcona school, Perth Avenue school, Western Avenue school and Malvern Avenue High School.

Weston, Ont.

High school. Sec.-treas., R. J. Dennis Architect, Munro & Mead, 140 Kingston road. General contractor, Geo. Sainsbury, Weston Heating, Keyes & Bull, Main S., Weston

Business Buildings and Industrial Plants

Barrie, Ont.

Alterations and extension to boot and shoe factory planned for Underhill, Ltd New machinery required

Bridgetown, Ont.

Extension to canning factory The Dominion Canners Ltd., general manager, J. J. Mairn, have been granted additional land by town for extension to their factory

Hamilton, Ont.

Pattern building and addition to foundry to cost $15,000 for Otis-Fensom Elevator Co., Victoria avenue N. Architect, Stewart & Witton, 2 Hughson street S. Tenders now being called: 2-sty., brick addition and steel construction.

Porcelain plant to cost $200,000 planned. A site of 20 acres has been secured. For further information write H. Marsh, Industrial Commissioner, City Hall, Hamilton.

Humberstone, Ont.

Garage and repair shops for Ford Motor Co. Representative, Mr. Wilkinson. Site has been purchased and plans will be prepared at once. Complete new shop equipment, tools, supplies, etc., required.

Montreal, Que.

Apartments, stores and offices, cost $750,000. St. Catherine E., for U. H. Dandurand, St. James and St. Lawrence Blvd. Architects, Ross & McFarlane, 1 Belmont street. Ten storeys, 102 x 53, three marquises of ornamental iron and glass, steel and marble stairs, corridor. Building to be erected after May 1st. 1913. Tenders will be called shortly.

Medicine Hat, Alta.

Flour mill, elevator, power house, etc., planned for the Maple Leaf Milling Co., Ltd. By-law to be voted on Nov. 12. Flour mill capacity 3,000 bbls., 196 lbs. each per day. An elevator 300,000 bus. capacity. A power house to operate machinery.

Moncton, N.B.

Woollen mill for Humphreys Unshrinkable Underwear Ltd. Manager, J. K. MacDonald. Architect, H. H. Mott, Germain street, St. John. Tenders received by architect. Plans and specifications at office of Architect and E. Albert Reilly, solicitor, Moncton. 2-sty., concrete foundation, brick construction.

Niagara Falls, Ont.

Printing factory to cost $5,000, Park street, for F. H. Leslie, Erie avenue Architect, J. U. Collins, Queen street. 2-sty., 50 x 50, concrete foundation, brick construction Plans in progress

Nanaimo, B.C.

Garage planned for Sampson & Young, c/o the B. C. Garage 40 x 100, brick construction. Site has been purchased on Front street

North Battleford, Sask.

Hotel to cost $100,000 for A. Brehant (solicitor) Architects, Stephenson & Evans 5-sty., 75 x 120, brick, stone and structural steel, concrete foundation Architect will receive all tenders

Billiard Saloon, cost $18,000, King St., for Foley & Pickel Architects Stephenson & Evans Two storeys, 110 x 35 brick construction, stone trimmings Plans in progress

St. Johns, Nfld.

Pulp mill and dam, cost $100,000 for The Horwood Lumber Company Sec.-treas., R. F. Horwood Pulp mill to run three grinders, capacity 24 tons per day 2,000 h.p. will be generated from Indian Arm River Mill to be in operation by August, 1913 Machinery required Concrete dam, 900 feet long now under course of construction

St. Andrews, N.B.

Addition to Algonquin Hotel for Canadian Pacific Railway, head office, Montreal, Que. Hotel Supt., Hayter Reid. Concrete addition of two storeys, hexagon tower to dining room. Plans in progress.

Three Rivers, Que.

Extension to glove factory for Acme Glove Co., Vitre E. and Elizabeth street, Montreal. Plans in progress.

Toronto, Ont.

Carriage shed for W. K. Murphy, 479 Queen. Architect, J. H. Stanford, Bloor and Ossington. Brick, cement foundation. Tenders received by okner.

Addition to bowling alley to cost $4,000, for Deutscher Verien, 41 Isabella street. Architects, Mitchell & White, 55 Isabella. Plans drawn.

Warehouse to cost $6,000, 1228 Yonge street, for W. Walker & Sons, 1228 Yonge street. Architect, J. A. McKenzie, Lumsden Bldg. 3-sty., 22 x 40, brick stone foundation. Plans drawn.

Printing offices, etc., for Murray Printing Co., 9-13 Jordan street. Sec.-treas., Douglas Murray. Site has been secured on Queen street west and plans will be prepared.

Garage to cost $3,000, for Canada Metal Co., Fraser avenue. Architect, F. H. Herbert, 65 Adelaide street E. Cut stone, brick and structural steel construction, cement piers foundation. Plans drawn.

Walkerville, Ont.

Public garage for Geo. Reid. Architect, Smith & Walker. 2-sty., 120 x 50, paint and workshop on 2nd storey. Plans in progress.

West Toronto, Ont.

Office building to cost $5,000, Dundas street, for Conger Coal Co. Sec., R. L. McCormack, 6 King street E. Architect, Ellis & Connery, Manning Chambers. 1-sty., structural steel and brick construction, stone foundation. Tenders called.

Wiarton, Ont.

Flour and grist mill to cost $8,000, for Chas. Reckin. 3-sty., 39 x 60, stone and brick construction, iron roofing, modern roller process, manufacturing machinery, capacity 75 bbls. per day. By-law to be submitted shortly to grant bonus.

Factory planned for the Northern Rubber Co. Ltd. Promoter, W. L. Nelson, Cleveland, Ohio. By-law to be submitted shortly for bonus. Company will occupy old buildings which will be extended and altered. Complete new machinery will be required.

Welland, Ont.

Hotel, cost $75,000, for Samuel Shapiro, 337 Sherman ave. N., Hamilton, Ont. Plans to be prepared.

CONTRACTS WARDED

Brantford, Ont.

Extension to foundry to cost $4,000, Sydenham street, for Pratt & Letchworth, Ltd. Builders, Schultz Bros. Co., Ltd. Dominion Bridge Co. have contract for installing crane for charging furnaces. 1-sty., 200 x 80, cement foundation, frame with galvanized iron laid on asbestos.

Addition to factory to cost $12,000, for the Pratt & Letchworth Co., Ltd. (Malleable iron works) Wilkins street. Manager, J. E. Hammond. Builders, P. H. Secord & Sons, Ltd., 137 Nelson street. 2-sty., 110 x 40, cement foundation, brick (sand lime) reinforced concrete.

Bridgeburg, Ont.

Addition to factory, Lewis street, for Buffalo Specialty Co., Buffalo, N.Y. General contractor, John Young. 2-sty., 60 x 40, brick, concrete foundation. Printing presses, emery wheels, gas engine required.

Chicoutimi, Que.

Store and residence to cost $3,500. Owner and builder, E. A. Quenneville. 3-sty., 48 x 43, stone foundation, wood and brick construction.

Store and residence to cost $5,000, for Antoine Hamel. Builder, L. Cimon, Chicoutimi West. 2½-sty., 45 x 35, cement foundation, wood and brick construction.

Cowansville, Que.

Dry kiln planned for W. F. Vilas. Builder, A. Ross. 60 x 34.

Fort William, Ont.

Bedding factory, cost $4,000, Vickers, for McKellar Bedding Co., Berlin, Ont. General contractors and architects, Seaman & Penniman, Fort William. Three storeys, 62 x 113, reinforced concrete, cement foundation.

Manufacturing plant, cost $20,000, for The National Tube Co. President, W. W. Near. Architect, owner. General contractor, M. H. Braden. Seven buildings, cement foundation, solid brick and structural steel construction.

Warehouse, cost $15,000, Hardisty St., for North Shore Supply Company. Architects and general contractors, Russell Bros. Two storeys, 50 x 70.

Business block, cost $25,000, Fredrica street, for James Donald, Fredrica St. Architects, Hood & Scott. General contractor, J. W. Nicholson. Two storeys, 63 x 70.

Cold storage plant, cost $20,000, Hardisty street, for Gordon, Ironsides & Fares Co. Arctitects and builders, Seaman & Penniman. Two storeys, 44 x 66.

Packing house to cost $40,000, Simpson street, for Matthews & Lang Co., foot of Bathurst street, Toronto. Architect, E. J. Greenstreet, 32 Adelaide St. E., Toronto. General contractor, M. H. Bradon. 2½-sty., 86 x 40, 95 x 50, reinforced concrete and mill construction.

Wire fence factory to cost $40,000 for Thomas Black, 76 Lombard street, Winnipeg, Man. Architects and general contractors, G. H. Archibald & Co., 827 Union Block, Winnipeg. 1-sty., 125 x 200, reinforced concrete or brick construction. Foundations in.

Grand Forks, B.C.

Business block to cost $14,000, for H. C. Kerman. General contractor, A. Jacobson. 1-sty. and basement, brick construction, concrete foundation. Building to be used as moving picture theatre and store.

Guelpn, Ont.

Iron wash house and dust arrester for Taylor Forbes Co., Ltd. Arciitects, and general contractors, P. H. Secord & Sons, Ltd., Brantford.

Hamilton, Ont.

Addition to bread factory to cost $2,800 for A. M. Ewing, 95 Ashley street. General contractor, W. H. Yates, 21 Leaming street.

Addition to factory to cost $15,000, for Canada Screw Co., 134 Wellington street N. Manager, J. Orr Callaghan. Architect, Mills & Hutton, Bank of Hamilton Bldg. General contractor, W. H. Yates, Jr., 18 Leeming street. 3-sty., 81 x 39, stone foundation, brick and mill construction.

Addition to garage, John street, for Thos. Ramsay, 15 Market Square. Architect, E. B. Paterson, 167½ King St. Masonry, S. Howard, 231 Mary street. Carpenter, A. L. King, 3 West avenue N. Steel work, Hamilton Bridge Works Co., Barton and Bay streets. 2-sty., 155 x 50, brick and steel construction.

Millbrook, Ont.

Bank to cost $7,000 for Bank of Toronto, head office Wellington street E., Toronto. Architect, G. F. Martin, 166 Bay street, Toronto. General contractor, A. A. McIntyre, Peterboro. Mason, Jas. Boyne, Peterboro. Heating and plumbing, R. G. Sturgeon & Co., Peterboro. 2-sty., 34 x 36, concrete and stone foundation, solid brick construction.

Montreal, Que.

Factory, cost $45,000, St. Antoine St., for Major Mfg. Co., Craig street. Architects, Hutchison, Wood & Miller, 50 Royal Insurance Bldg. General contractors, McGregor & Reid, 14 Guy Blk. Ornamental iron work, Jno. Watson & Son, Ltd., 167 Wellington street. Four storeys, 123 x 93.

Store and residence, cost $3,600, for I. Romoff, 1962 Papineau. Builder, S. Cousboff, 1882 Papineau. Two storeys, 26 x 40, cement foundation, brick veneer and structural steel construction.

Office building to cost $950,000, St. Catherine, Bleury, Alexander and Edward, for Belgo Canadian Realty Co. Architect, Finlay & Spence, 46 Beaver Hall Hill. General contractor, P. Lyall & Sons Construction Co., Transportation Bldg. Old buildings are now being demolished.

North Battleford, Sask.

Garage, cost $20,000, Victoria and 2nd ave., for Ralph Brigham. General contractor, G. Quaadman. Two storeys, 50 x 100, brick and concrete construction, concrete foundation.

Nanaimo, B.C.

Stores and apartments to cost $10,000, for A. E. Planta, c/o The Dom. Trust Co., Commercial street. General contractors, Carver, Jones & Carver, 329 Pender street E., Vancouver. Brick, the Dom. Shale Brick & Sewer Pipe Co., 914 Dominion Trust Bldg., Vancouver. 2-sty., brick construction; 6 stores on ground floor.

Niagara Falls, Ont.

Warehouse, Ferry street, for Concrete, Stone & Coal Co., Ferry street. Company's architect prepared the plans. Work being done by day labor. Old buildings being demolished.

Ottawa, Ont.

Stores and apartments to cost $30,000, Somerset street, for S. Miller, Bank street. Architect, W. H. George, Castle Bldg. General contractor, Alex. Christie, Kenniston Apartments. 4-sty., brick construction.

Quebec, Que.

Warehouse for A. Lyonnai, Laliberte. General contractor, Alph. Beaumont, Limoilou. 2-sty., 30 x 40, wood and asbestos shingles. Excavation started.

Regina, Sask.

Warehouse to cost $55,000, Broad St. and 6th avenue, for H. G. Smith & Co. Architects, Storey & VanEgmond, Credit Foncier Bldg. General contractors, Lyall Mitchell Co., 389 Main street, Winnipeg. 75 x 112, red pressed brick and mill construction, stone trimmings; 2 elevators, 1 electric automatic chute; steel roll doors.

St. Catharines, Ont.

Bank and office building, cost $65,000, St. Paul street, for Canadian Bank of Commerce. Architects and builders, Dominion Realty Co., King & Jordon streets, Toronto. Three storeys, 36 x 35, stone and brick construction, terra cotta.

Stratford, Ont.

Factory, cost $50,000, Ontario street, for MacDonald Thresher Co., Erie St. Architect, J. S. Russell, 21 Downie St. General contractors, Pounder Bros.

St. Boniface, Man.

Factory, Rue St. Jean Baptiste, for Winnipeg Paint & Glass Co., 140 Portage avenue E., Winnipeg. General contractors, J. McDiarmid Co., Canada Bldg., Winnipeg. Three buildings, 1-sty., saw mill for stone, 50 x 50; finishing plant, 50 x 100, warehouse 90 x 150; cement foundation, frame and glass construction.

St. Thomas, Ont.

Extension to car wheel factory to cost $30,000, Talbot street, for Canada Iron Corporation Ltd. Excavation, A. E. Ponsford, 18 John street. Carpenter, Green Lumber Co., White street. Roofing, C. Riddle, 58 Railway street. 1-sty. cement foundation, cement and frame construction.

Factory to cost $10,000, Curtis street, for St. Thomas Metal Vault Co. Manager, A. J. Stough. Architect, J. J. Finlay. General contractor, A. E. Ponsford. 2-sty., 60 x 150, brick construction.

Toronto, Ont.

Addition to factory to cost $8,000, for Matthews Bros., 788 Dundas street. Architects, Ellis & Connery, Manning Chambers. Builder, H. Needham, 318 Crawford. 3-sty., brick and reinforced concrete construction, cement foundation.

Garage to cost $3,600, for T. A. Crow & Co., 627 Yonge street. Builders, Firth & Angus, 81 High Park avenue. 1-sty., cement foundation, reinforced concrete and brick construction.

Winnipeg, Man.

Warehouse to cost $18,000, for Sure Nozick & Co., 637 Main street. Architect, M. Blankstein, 150 Dufferin Ave. General contractor, A. J. Bonnett, 492 Flora avenue. 3-sty., 25 x 80, pressed brick and stone construction, cement foundation.

Residences

Chicoutimi, Que.

Residence to cost $3,000 for Treffle Harvey, Begin street. 3-sty., 40 x 35, stone foundation, wood and brick construction. Plans prepared.

Residence to cost $3,000 for Jos. Tremblay, Begin street. 3-sty., 36 x 30, stone foundation, brick and frame construction. Plans prepared.

Residence to cost $3,000 for J. R. Lamarre, Racine street. 3-sty., 75 x 24, stone foundation, wood and brick construction. Plans in progress.

Hamilton, Ont.

Apartment house to cost $15,000, Bay street, for W. A. Noble, 80 George St. Architect, Watt & Blackwell, 125 Lister Chambers. 3-sty., 58 x 50, stone and brick construction, stone foundation. Plans in progress.

Montreal, Que.

2 residences, Bloomfield avenue, for Maple Leaf Realties, Ltd., 513 Merchants Bank Bldg. Architect, C. A. Mitchell, 58 Beaver Hall Hill, is preparing plans and tenders will be called.

Ottawa, Ont.

Residence to cost $6,000, Marlboro, for C. E. Mortureux. Architect, W. E. Noffke, Central Chambers. 2½-sty., 30 x 40, brick veneer, stone foundation. Plans in progress.

Peterboro, Ont.

Parsonage, Rubidge street, for Methodist Church Congregation. Pastor, Rev. J. T. Mansell, Reid street. Chairman Building Committee, W. Geo. Morrow, George street. Stone foundation, lime stone and brick construction. Plans in progress.

Ste. Luce, Que.

Residence to cost $10,000 for Rev. F. Sirois, Ste. Luce. Architects, Ouellet & Levesque, 115 John street Que. Tenders received after Nov. 2nd. 3-sty., 40 x 60, stone foundation, Scotch brick construction.

Toronto, Ont.

Residence to cost $4,500, St. Clair and Lauder avenue, for Jno. Gillian. Architect, S. B. Coon, Temple Bldg. 2-sty. and attic, stone foundation, brick construction. Tenders called.

Residence to cost $12,000, Russell Hill Drive, for Dr. Wallace Seccombe, 114 Carlton street. Architect, C. F. Wagner, 15 Toronto street. Tenders are in, contracts not yet awarded. Brick foundation, cut stone and brick construction.

Apartments to cost $18,000, Ontario street, for Mrs. Catherine Sheedy, c/o architect. Builder, J. P. Hynds, 199 Yonge street. 3-sty., 6 suites, stone foundation, brick construction. Tenders called.

Residence, cost $7,000, Euclid avenue, for Mr. Brodey. Architect, A. J. Rattray, Star Bldg. Two storeys, brick construction and foundation. Tenders to be called.

CONTRACTS AWARDED

Brampton, Ont.

Residence to cost $20,000, for Pease Foundry Co. Ltd. Sec., J. E. Ross, 23 Queen street E. Architects, Ellis & Connery, Manning Chambers. General contractor, T. A. McClure, Brampton. Frame and stucco, cement foundation. 3 pair semi-detached, 4 attached and 1 rooming house.

Chicoutimi, Que.

Residence to cost $6,000 for Dr. Eugene Tremblay, Racine street. Builder, Harry Paquet, de N. D. de Levis, Ingenieur. 2½-sty., 52 x 40, stone foundation, brick construction.

Residence to cost $4,500 for J. A. Claveau. Builder, L. Simon, Chicoutimi West. 2½-sty., 45 x 35, cement foundation, wood and brick construction.

Residence to cost $5,000 for L. P. Desbiens, Postmaster. Builders, Saulnier & Saulnier. 2½-sty., stone foundation, wood and brick construction.

Residence to cost $3,300. Owner and builder, Charles Morin, Village St. Ange. 3-sty., 28 x 36, cement foundation and construction, sheet iron roofing.

Guelph, Ont.

Three residences. Architect and general contractor, Wm. Brydges. Stone foundation, pressed brick construction. Permit granted.

Hamilton, Ont.

Residences to cost $7,200, for R. Kirkpatrick, 153 Herkimer street. General contractors, Ireland & Buntin, 56 Ferrie street west. Concrete and stone foundation, brick construction.

Remodelling residence to cost $15,000, for R. L. Gunn, 86 Charlton avenue. Architect, J. D. Corrigan, 231 Catharine St. N. General contractors, Jno. Poag & Co., Westinghouse avenue. Masonry, R. Isbister, 125 Wellington street S. Ptg., A. & J. Halloran, 658 Barton St. E.

Residence to cost $4,000, for G. Dowswell, 198 Hughson street N. Mason, Taylor & Wilson, 1 Rutherford avenue. Plmg., W. J. McArdle, 317 Emerald St. Electric work, L. H. Landers, 110 King street west. 2½-sty., 32 x 30, stone foundation, brick construction.

Montreal, Que.

Residence to cost $6,000, Garnier. Owner and builder, Arthur Frenette, 212 Fabre. 3-sty., 26 x 62, pressed brick, stone foundation. Excavation started.

Residence to cost $7,200, Oxford Ave. Owner and builder, Henry Gaffney, 204 St. James street. 2-sty., 14 x 36, brick, cement foundation.

Residence to cost $10,000, Beaconfield. Owners and builders, British Construction Co., 238 St. James. 2-sty., 50 x 60, cement, brick veneer construction.

Residence to cost $1,200, Nicolet St. Owner and builder, Johnny Mathier, 206 Nicolet. 3-sty., 21 x 44, cement, brick veneer construction. Excavation started.

Residence to cost $3,000. Owner and builder, Henri Gravel, 337 Wurtele. 2-sty., 25 x 35, brick, cement foundation.

Residence to cost $5,100, St. Germain. Owner and builder, Arcadius Beaulieu, 512 St. Germain. 3-sty., 29 x 90, cement foundation, brick veneer construction. Excavation started.

Apartment house, Cote de Neiges Rd. Owner and builder, James H. Maher, Transportation Bldg. 10-sty., structural steel and reinforced concrete construction, cement foundation.

Residence to cost $5,000, Messier. Owner and builder, J. O. Chenome, 168 Beaudry. 3-sty., 25 x 52, brick veneer construction, stone foundation.

4 cottages to cost $12,000, Old Orchard. Owners and builders, Beaudin, Gagne & Bourgeon, 1815 Notre Dame W. 2-sty., 15 x 68, cement foundation.

(Continued on page 78)

Tenders and For Sale Department

Representatives Wanted

One of the largest firms in the United States manufacturing water meters desires to secoure representatives in Eastern and Western Canada. Only firms or individuals having good connections with municipal authorities and town and city engineers are desired. Write giving particulars to Box 637, Contract Record & Engineering Review, Toronto. 45-47-76

Province of New Brunswick

Department of Public Works

Notice to Contractors

Sealed tenders marked "Tender for the construction of the Substructure of the Reversible Falls Bridge, Saint John, N.B.," will be received at the Department of Public Works, Fredericton, N.B., until **Monday, December 2nd, 1912,** at noon,

Plans, specifications and other information to be seen at the Provincial Government Rooms, St. John, N.B., and at the Provincial Public Works Department, Fredericton, N.B.

Tenderers are particularly requested to examine the plans, specifications and location of the work before tendering, and the yare expressly notified that no deviation from the specifications shall be allowed unless the same has been previously authorized by and written permission therefor obtained from the Chief Commissioner of Public Works.

Tenders must be submitted on the Department's standard tender forms, supplied for this purpose. They shall be signed with the tenderer's actual signature, stating occupation and place of residence. In the case of firms, the actual signature, the nature of the occupation and place of residence of each member of the firm must be given.

The tender shall contain unit prices for each of the following items:—

(a) For foundation excavation, rock, per cubic yard in cut. Other than rock, per cu. yd. in cut.

(b) Stone filling, per cubic yard in place.

(c) Earth filling, per cubic yard in place.

(d) Concrete masonry, per cubic yard of finished work.

(e) Granite masonry, per cubic yard of finished work.

(f) Dry stone at the back of retaining walls, per cubic yard of finished work.

(g) Hand railings on concrete retaining walls, to include all materials above the top of coping, per lineal foot of finished work.

Each tender must be accompanied by a certified bank cheque or cash for an amount of $2,500 (Twenty-five Hundred Dollars), which will be forfeited if the party tendering declines to enter into contract when called upon. Such bank cheque or cash will be returned to the parties whose tenders are not accepted; but with the party to whom the contract is awarded, it shall be retained until the final completion of the contract and its acceptance by the Department.

All tenders must be enclosed in sealed envelopes, endorsed as above, and no tender will be considered which does not adhere strictly to the requirements prescribed herein.

The Department does not bind itself to accept the lowest or any tender.

JOHN MORRISSY,
Chief Commissioner of Public Works.

Public Works Department.
Fredericton. N.B., Nov. 4, 1912. 45-81

Mail Contract

Sealed tenders addressed to the Postmaster General will be received at Ottawa until noon on **Friday, the 13th of December, 1912,** for the conveyance of His Majesty's Mails on a proposed Contract for four years, six round trips per week over Rural Mail Route from Kettleby, Ont., to commence at the pleasure of the Postmaster General.

Printed notices, containing further information as to conditions of proposed Contract may be seen and blank forms of tender may be obtained at the Post Offices of Kettleby, Glenville and at the office of the Post Office Inspector at Toronto.

Post Office Department, G. C. ANDERSON,
Mail Service Branch. Superintendent.
Ottawa, October 29th, 1912. 45-47-77

Town of Humboldt
(Province of Saskatchewan)

Electric Lighting

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on **Thursday, November 21st, 1912,** for the following works:

Contract "B"—Power House.
Contract "H"—Two Return Tubular Boilers.
Contract "J"—High Speed Steam Engine.
Contract "K"—Electric Lighting System.

Plans and specifications may be seen at the office of the engineers, Winnipeg and Toronto, and at the Town Hall, Humboldt.

C. W. ANDREASON, Esq., Mayor.
Humboldt, Sask.
W. H. STILES, Esq., Sec.-Treasurer,
Humboldt, Sask.
CHIPMAN & POWER, Engineers,
45-46-80 Toronto and Winnipeg.

City of London, Ontario

Tenders for Wharncliffe Road Highway Bridge over Thames River

Sealed proposals, addressed to the "Chairman and Members No. 2 Committee," will be received at the office of the City Clerk until 5 p.m. on **Wednesday, November 13th, 1912,** for constructing and erecting a 270-foot span pin-connected Petit Truss Highway Bridge with necessary approach spans, concrete piers and abutments complete.

Each bidder shall name lump sum for the various parts of the work as described in the general specification and give price for any deductions or additions to the same and make his tender on the form furnished by the City Engineer.

Plans and specifications and form of tender may be seen at and obtained from the office of the City Engineer.

Contractors to enclose a marked cheque for ten per cent. (10 p.c.) of the amount of their bids.

The city reserves the right to reject any or all bids and to accept any bid.

W. E. ROBINSON, GEO. E. WRIGHT,
Chairman, No. 2 Committee. City Engineer.
43-45-64

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

Water Commission
of the
Town of Dunnville

Sealed tenders addressed to B. L. Edgecombe, Chairman of the Water Commission, will be received up to 9 p.m. on the **11th of November, 1912,** for one steel elevated tank of 100,000 Imperial gallons capacity and alternatively for one of 125,000 Imperial gallons capacity.

Specifications and instructions to bidders to be had on application to the undersigned.

ALAN MAIR JACKSON.
Superintendent.
44-45-69 P. O. Box 196, Dunnville, Ont

Tenders for Construction of

Municipal Telephone System

Sealed tenders addressed to James E. Quick, Reeve of Pelee, Scudder P.O., Ontario, will be received up to **Saturday, November 16, 1912,** at six o'clock p.m., for the construction of twenty-four miles of Municipal Telephone Lines on Pelee Island, Ontario.

Tenders may be for work in whole, including putting in poles, stringing wires, installing instruments, etc., or individually for each portion of the work.

Parties tendering must satisfy themselves regarding location, route of lines, etc.

The lowest or any tender not necessarily accepted.

An accepted bank cheque equal to 10 per cent. of the tender must accompany each tender as a guarantee of good faith.

Plans, specifications, etc., can be seen at the office of Wm. Stewart, Township Clerk.

Signed on behalf of Pelee Municipal Telephone Board.

JAMES E. QUICK, Reeve,
44-45-70. Scudder P. O.

Tenders to Plumbers and Steamfitters

Tenders will be received by the undersigned up to 5 p.m., **Wednesday, the 13th inst.**, for all plumbing and vacuum steam heating and hot water heating required in certain foundry buildings and office building at Belleville, Ont., for Messrs. Marsh & Henthorn, Limited. Plans and specifications can be seen and all particulars obtained at the offices of the company at Belleville, and from the architect at 65 Adelaide St. East, Toronto.

F. H. HERBERT,
Architect.

45-86

Board of Education

Sealed tenders, whole or separate, addressed to the Secretary-Treasurer of the Board, will be received until

Friday, Noon, November 15th, 1912

for the several trades required in the erection of

New School Building on Pauline Avenue

Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, City Hall. Each tender must be accompanied with an accepted bank cheque for five per cent. of the amount of tender or its equivalent in cash. Tenders must be in the hands of the Secretary-Treasurer at his office in the City Hall, not later than 12 o'clock noon on the day named, after which no tender will be received. The lowest or any tender will not necessarily be accepted.

W. W. HODGSON,
Chairman of Committee.
W. C. WILKINSON,
Secretary-Treasurer.

45-86

Sealed tenders addressed to the undersigned and endorsed "Tender for Public Building, Wallaceburg, Ont.," will be received at this office until 4 p.m. on **Wednesday, November 20, 1912,** for the construction of a Public Building at Wallaceburg, Ont.

Plans, specifications and form of contract can be seen and forms of tender obtained at the Post Office, London, Ont., at the Post Office, Wallaceburg, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, October 30, 1912.

Newspapers will not be paid if this advertisement is inserted without the authority of the Department.—29081 45-46-78

TENDERS

Tenders will be received by the undersigned up till noon, **November 16th,** for all the various trades in the erection and completion of a two storey bank building on the northeast corner of College and Bathurst streets, Toronto, for the Metropolitan Bank. Plans, specifications and all information can be obtained at the office of the architects.

DARLING & PEARSON,
2 Leader Lane, Toronto.

The lowest or any tender not necessarily accepted. 45-85

Tenders Wanted

Sealed tenders will be received by the undersigned until noon on **Tuesday, November 12th,** for

The Construction of a Building for the Avonmore Rural Continuation School District

The Building is to be completed by August 1st, 1913

Plans and specifications can be seen at the offices of the Secretary-Treasurer and of

C. P. Meredith,
Architect, Ottawa

Tenders to be accompanied by certified cheque for ten per cent. of the amount of tender, which will be forfeited should the contractor fail to sign contract.

Lowest or any tender not necessarily accepted.

A. O. MILLER, Sec.-Treas.,
Avonmore, Ont.

45-79

CITY OF KAMLOOPS, B. C.

Barriere River Hydro-Electric Power Plant Intake Dam and Flume System

Tenders will be received up to noon **November 14th, 1912,** for the construction of Intake Dam and Flume System for the proposed Hydro-electric Power Plant on the Barriere River.

Plans and specifications may be seen at the office of the City Clerk, Kamloops, and at the office of Dr. Cane [illegible] & Co., Consulting Engineers, Suite 911-914 Rogers Building, Vancouver, B.C. Each tender must be addressed to the City Clerk, in an envelope marked "Tender for Dam and Flume," and accompanied by a certified cheque amounting to five per cent. of the tender.

The lowest or any tender not necessarily accepted.

J. J. CARMENT,
City Clerk.

44-45-71

Water Commission
OF THE
Town of Dunnville, Ont.

Sealed proposals, addressed to B. L. [illegible]combe, Esq., Chairman of the Water Commission for the Town of Dunnville, will be received up to 9 p.m. on **Monday, November 18th,** for a turbine pump installation for [illegible] purposes.

All data to be obtained on application to the undersigned.

ALAN MAIR JACKSON, Superintendent,
P. O. Box 196, Dunnville, Ont.

45-46-83

Sealed tenders addressed to the undersigned and endorsed "Tender for Public Building, Three Rivers, P.Q.," will be received at this office until 4 p.m., on **Monday, November 25, 1912,** for the construction of Public Building at Three Rivers, P.Q.

Plans, specification and form of contract can be seen and forms of tender obtained at the offices of Mr. Chas. Lafond, Architect, Three Rivers, P.Q.; R. L. Deschamps, Esq., 103 St. Francois Xavier street, Montreal, and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honourable the Minister of Public Works, equal to ten per cent (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, November 2, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—30298. 45-46-82

For Sale

[illegible] Steam Fire Engine [illegible] 500 gallons [illegible] condition, only [illegible] the most of the use being [illegible] will be received for the above [illegible] November 22, 1912.

[illegible] CARLING, Clerk,
[illegible]

45-46-84

Agents Wanted

Large United States [illegible] Canadian municipalities [illegible] Waterproofing [illegible] Box 621, Contract Record, Toronto, Ont. [illegible]

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price. The Winnipeg Iron & Metal Company, 296 Princess Street, Corner King; Telephone St. John 382, Winnipeg. [illegible]

For Sale

Stone crusher, portable, with elevator. Also 16 h.p. gas engine, portable. Enquire Box 626, Contract Record, Toronto, Ont. 42-T.F.-58

Residences

(Continued from page 73)

pressed brick construction. Excavation started.

Flats to cost $9,000, Masson. Owner and builder, Albert Desmarchais, 76 Masson. 3-sty., 47 x 45, brick, cement foundation.

Residence, cost $4,800. Owner and builder, Alias Desrosiers, 1053 Lafontaine. Three storeys, 25 x 50, cement foundation, brick veneer construction.

Residence, cost $42,000, Third Ave. Owner and builder, W. F. Rawling, 380 Third ave., Rosemount. Two storeys, 35 x 40, cement foundation, brick veneer construction.

Residence, cost $5,400, Chabot. Owner and builder, Zoel Martel, 1193 Delorimer ave. Three storeys, 24 x 40, cement foundation, brick construction.

Residence, cost $5,400. Esplanade. Owner and builder, Narcisse Fournier, 3677 Esplanade ave. Cement foundation, pressed brick construction.

Residence, cost $6,600, Hutchison. Owner and builder, Arthur Cloutnier, 806 Durocher. Three storeys, 25 x 42, cement foundation, brick veneer construction.

Residence, cost $4,200, Gouin. Owner and builder, Everard Vanderurec, 1235 Ontario. Two storeys, 28 x 30, brick veneer construction, cement foundation.

Residence, cost $4,150. Owner and builder, Jos. Normandin, 2108a St. James street. Two storeys, 25 x 40, cement foundation, brick veneer construction.

Residence, cost $4,200. Owner and builder, Joseph Frenette, 290 Breboeuf. Three storeys, 25 x 60, cement foundation, brick veneer construction. Excavation started.

Flats, cost $8,400, Boyer. Owner and builder, Henri Chartrand, 489 Rivard. 3 storeys, 50 x 38, brick, stone foundation.

Residence, cost $3,600, Des Erables. Owner and builder, Leon Pelletier, 255 Cartier. Three storeys, 24 x 40, brick, stone foundation.

Residence, cost $4,800, St. Urbain. Owner and builder, L. Letourneau, 245a Waverly. Two storeys, 25 x 38, pressed brick, cement foundation.

Residence, cost $3,600, for Alph. Allard, 802 Frontenac. Builder, J. B. Christin & Cie, 232 5th ave., Rosemount. Three storeys, 25 x 40, pressed brick construction, cement foundation.

Residence, cost $3,000, for James Donohue, 2082 St. Hubert. Builder, J. Sauvogean. Two storeys, 25 x 34, stone foundation, brick veneer construction.

Ottawa, Ont.

Residence to cost $5,000. Owner and builder, F. L. Campbell, 141 Preston St. 2-sty., 33 x 38, double brick veneer, stone foundation.

Quebec, Que.

Residence, for Alphonse Blouin, 34 Alfred street. General contractor, D. Jacques. Roofing, A. Lachance. Painting Mander & Tremblay. Three stys., 60 x 40, stone foundation, wood and brick construction. Excavation started.

Toronto, Ont.

Residence to cost $7,000, St. Clair avenue, for W. J. Slanker, 309 Avenue road. Architect, F. R. Berry, 1107 College street. Builder, J. H. Baker. 2½-sty., brick foundation and construction.

1 pair residences to cost $7,000, Mallon avenue. Owner and builder, Jno. Lutz, 544 King street W. 2-sty., brick construction and foundation.

Two residences, cost $5,000, Pacific ave. Owner and builder, Jos. Levoir, 2 Noble street. 2½ storeys, brick, stone foundation.

Victoria, B.C.

Residence to cost $9,000 (N.E. corner Dallas Rd. and Chester St.) for A. A. Belbeck, 1067 Chamberlain St. Architect, Jesse M. Warren, Central Bldg. General contractor, O. G. Smith.

Winnipeg, Man.

2 residences to cost $10,000, McMillan avenue. Owner and general contractor, R. Robson, 284 Simcoe. 2-sty., 24 x 32, brick foundation and construction.

Apartment house, cost $100,000, Weatherdon ave. Owner and general contractor, F. Moses, 453 Dufferin avenue. Architect, Max Blankstein, 450 Dugerin ave. Three storeys, 74 x 110, concrete foundation, brick construction.

Residence to cost $11,000, Montrose. Owner and general contractor, W. T. Carson, 80 Sherbrooke street. 2½-sty., 33 x 37, brick, stone foundation.

Residence to cost $3,500, for R. Siderfin, 756 Beresford avenue. General contractor and architect, H. Brooks, 522 Kylemore. Two storeys, 24 x 32, frame, stone foundation.

Residence to cost $5,000, Greenwood Place. Owner and general contractor, W. Thompson. 2-sty., 20 x 32 ft. 6 in., brick veneer, stone foundation. Excavation started.

Residence to cost $8,000, Ethelbert. Owner and general contractor, W. A. Cameron, 238 Arlington street. 2-sty., 30 x 32, frame, stone foundation.

2 residences to cost $12,000, Lenmore. Owner and general contractor, B. Taylor, 369 Home street. 2½-sty., 25 x 35, brick veneer construction, stone foundation.

Residence to cost $4,000, Stiles street. Owner and general contractor, J. Stoller, 41 Andrews. 2-sty., 20 x 28, stone foundation, frame construction.

Residence to cost $3,500, Polson Ave. Owner and general contractor, W. E. Toshak, 121 Cathedral avenue. 2-sty., 22 x 26, frame construction, stone foundation.

Residence to cost $6,000, McWilliam avenue. Owner and general contractor, W. A. Cameron, 238 Arlington street. 2-sty., 28 x 24, frame, stone foundation.

Power Plants, Electricity and Telephones

Brantford, Ont.

By-law was passed by 236 majority providing for installation of the hydro-electric system. Mayor, Hartman. Clerk, H. F. Leonard. Chairman Power Commission, W. A. Hollinrake.

Cannington, Ont.

The Citizens of Cannington and district of North Ontario County are interested in the establishment of a light and power system in conjunction with the Hydro-electric Power Commission of Ontario. President, Adam Dobson. Sec., Wm. A. Robinson. It is expected that a power house will be established on Severn River near Orillia.

Ft. William, Ont.

Gas plant to cost $10,000, C. P. R. property, for Pintoch Commission Gas Co., New York. Representatives. Mr. Pearson, Avenue Hotel. Architect, Owners. General contractor, R. E. Wright. 2-sty., 32 x 32, cement foundation, brick construction.

Humboldt, Sask.

Electric power house and installation to cost $30,000. Clerk, W. H. Stiles. Engineer, Chipman & Power, Mail Bldg., Toronto.

Kamloops, B.C.

Tenders received by clerk until Nov. 14th, for intake dam and flume system for Hydro-electric power plant on the Barrier River. Plans, specifications, etc. at office of engineer and clerk. Clerk, J. J. Carment. Consulting engineers, Du Cane, Dutcher & Co., 911-14 Rogers Bldg., Vancouver.

Rapid City, Man.

Electric lighting system to cost $12,000. Clerk, C. G. Murray. General contractors, The British Canadian Engineering & Supply Co., 122 Phoenix Bldg., Winnipeg.

St. Jerome, Que.

Dam and electric light plant. Engineers, Surveyor & Frigon, 56 Beaver Hall Hill, Montreal. General contractos, The Contractors Co., Ltd., 204 St. James street, Montreal. Work about to start.

St. Thomas, Ont.

Motors and transformers for Canada Iron Corporation Ltd. Contract awarded to Canadian Westinghouse Co., Hamilton.

Scudder, Ont.

Telephone system. Tenders received by Reeve Jas. E. Quick until Nov. 16th for construction of 24 miles of Municipal Telephone lines on Pelee Island. Plans, etc., at office of Twp. Clerk, Wm. Stewart.

Winnipeg, Man.

Cable for arc lighting to cost $30,250. Engineer, J. G. Glassco, 54 King street. General contractor, The Canadian British Insulated Co., 512 Power Bldg., Montreal; for 100,000 ft. No. 6 B. & S. twin conductor arc lighting cable, lead covered and armoured at 30¼c. per ft.

Walkerville, Ont.

The town council has authorized preparation of plans for extensions to the street lighting system.

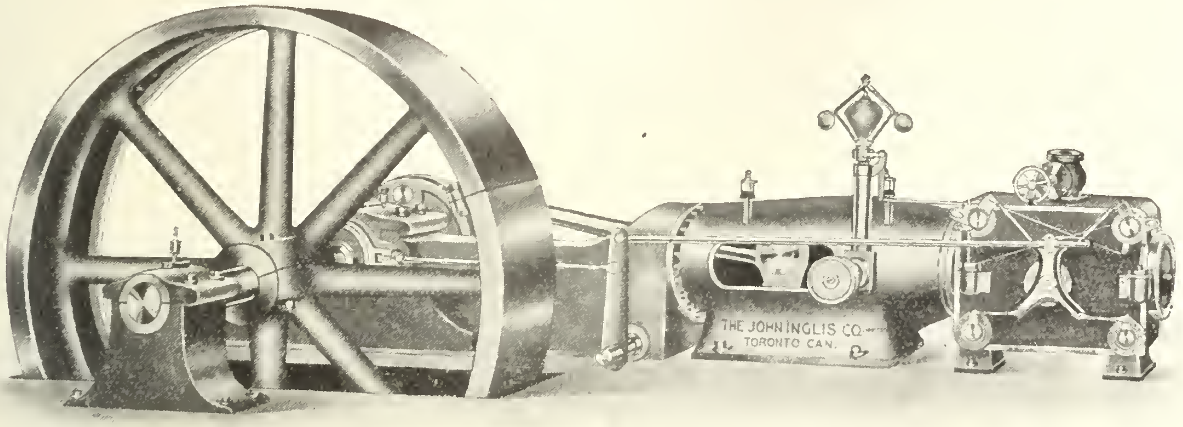
Windsor, Ont.

City council contemplates the installation of electric lighting plant equipment, cost $20,000. Clerk, Stephen Lusted.

Business Notes

Chatham, Ont.

Fanning mill. Manson Campbell Fanning Mill damaged by fire. Mgr., Man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ENGINEERS AND BOILERMAKERS

Strachan Avenue, TORONTO

[illegible] New equipment required [illegible] once.

Planing mill of the Wm. M. Drader Lumber Co., Thames and Salter streets, burned; loss $20,000. Will rebuild at once.

Gracefield, Que.
Stores and residences of Vineberg & Co. and M. Talbot burned; loss $9,000.

Lindsay, Ont.
Lumber mill of Baker Lumber Co. destroyed by fire; loss $20,000. Will probably be rebuilt during the winter.

Lucknow, Ont.
Apple evaporator of John Joynt burned; loss $3,000. Will rebuild.

St. Thecle, Que.
Arthur Cloutier's store and residence burned, loss $8,000; also Narcisse Audy residence and Lucien Lafrance, store. Will rebuild.

St. Ublade, Que.
Store, residence, etc., of Azarias Rompree burned; loss $6,000. Will rebuild.

Truro, N.S.
Business block burned; loss $40,000; occupied by Madam Lunn, millinery shop; E. G. Moxon, druggist; Rogers' barber shop, Pithavitch & Co., G. H. Vernon, barrister, library; Truro Band; D. A. Tattrie, tailor; R. A. Tremaine, barrister.

Tillsonburg, Ont.
Pork factory of Tillsonburg Packing Co. burned; loss $40,000. Mgr., John Loudon. Will rebuild at once. New machinery and equipment required.

Toronto, Ont.
National Casket Company's factory at Niagara and Tecumseh streets destroyed by fire, loss $35,000.

Walkerton, Ont.
Factory of Canadian Spool & Bobbin Co. burned; loss $5,000. Repairs to be made immediately.

Miscellaneous

Lauzon, Que.
The town council plan to purchase new fire apparatus. Address communications to Sec.-treas., Lauzon. Hydrants and fire hose required.

Ottawa, Ont.
Supplies, Dom. Govt., Dept. of the Naval Service. Deputy Minister, G. J. Desbarats, Ottawa. Tenders received by Deputy Minister until noon, Nov. 20th for the following: Rubber materials, varnishes, oakum, oils, paints, polishing paste, soap. Deliveries to be made at H.M.C. Dockyards, Halifax, N.S., and Esquimalt, B.C. Specifications at office of Deputy Minister.

Windsor, Ont.
[illegible] steam fire engine planned by council and ratepayers will vote on by-law Oct. 31st. Chairman committee, [illegible] Irwin.

Winnipeg, Man.
Machinery to cost $5,670, one 48-in. [illegible] back geared lathe 12 ft. 6 in. between centres with regular equipment fitted with motor of sufficient power to drive lathe at maximum capacity; alternating current 550 volt, 3 phase, 60 cycle; 1 shingle punch and shear with 30-in. throat to shear ¾-in. boiler plate and punch 1-in. hole through 1-in. boiler plate, etc., as above. one 5-ft. plain Radial drill, etc., as above. Tenders received by secretary until Nov. 7, 1912.

New Companies

Monarch Construction and Realty Company, Limited, has been incorporated to carry on business as a general land and building company with head office at Toronto. The provisional directors include W. L. Clarke, manager; H. R. Turner, accountant, of Toronto.

Abington Realty Company Limited, has been incorporated with a capital of $100,000 to carry on business as a land and building company with head office at Toronto. The provisional directors are C. M. Johnston, G. R. Kappele, barristers, and L. V. Wright, assistant manager, all of Toronto.

The Algoma Hardwood Flooring and Lumber Manufacturing Company, Limited, has been incorporated with a capital of $40,000 to carry on a general timber and lumber manufacturing business with head office at Steelton. The provisional directors are Wm. Wilks, real estate broker, and Walter Stringer, assessor, both of Steelton.

East Melfort Investors, Limited, have been incorporated with a capital of $36,000 to carry on business as a general land and building company with head office at Toronto. The provisional directors are D. G. M. Galbraith, A. K. Goodman, barristers, and W. A. McFarlane, real estate broker, all of Toronto.

Roxborough Gardens of Hamilton, Limited, have been incorporated with a capital of $50,000 to carry on business as a land and building company with head office at Hamilton. The provisional directors are W. W. Currier, H. R. Mason and M. D. Judah, real estate agents, all of Hamilton.

The Forest Basket Company, Limited, has been incorporated with a capital of $25,000 to manufacture and deal in timber, lumber, woodenware, &c., with head office at Forest. The provisional directors are Tom. Maylor, R. F. Scott, and T. W. Maylor, merchants, all of Forest, Ont.

City Investments, Limited, has been incorporated with a capital of $100,000 to erect buildings and deal in building materials, with head office at Toronto. The provisional directors are W. C. Chisholm, Neil Sinclair and J. C. Smith, all of Toronto.

Stone-Grant Lumber Company, Limited, has been incorporated with a capital of $500,000 to carry on business as lumbermen, general contractors, &c., with head office at Toronto. The provisional directors are A. G. Ross, G. H. Sedgwick, solicitors, and E. V. Macmillan, law clerk, all of Toronto.

Central Corners, Limited, has been incorporated with a capital of $260,000 to carry on a general land and building business with head office at Toronto. The provisional directors are J. V. Macfarlane, P. S. Cowell and G. R. Kappele, barristers, all of Toronto.

Plested Construction Company, Limited, has been incorporated with a capital of $150,000, to manufacture and deal in paving brick, cement, limestone and other building materials, with head office at Galt, Ont. The provisional directors are G. A. Dobbie, F. S. Scott, and J. H. Fryer, manufacturers, all of Galt.

The Beechwood Park Realty Company, Limited, has been incorporated with a capital of $50,000, to carry on business as a general land and building company, with head office at Smith's Falls. The provisional directors are C. H. Frost, publisher; F. W. Frost, merchant, of Plainfield, N.J., and Jno. Davidson, contractor, of Smith's Falls.

Capital Roofing and Cornice Company, Limited, has been incorporated with a capital of $40,000, to carry on business as dealers and manufacturers in all kinds of metal goods and contractors' supplies, with head office at Ottawa. The proviional directors are Harold Fisher, L. P. Sherwood, barristers, and J. J. Lyons, contractor, all of Ottawa.

The Ingleby-Taylor Company, Limited, has been incorporated with a capital of $40,000, to carry on business as builders and contractors, with head office at Brantford. The provisional directors are E. E. Taylor, C. E. Ingleby, contractors, and A. M. Harley, barrister, all of Brantford.

C. G. Anderson Lumber Company, Limited, has been incorporated with a capital of $40,000, to carry on a general lumber business in all its branches with head office at Toronto. The provisional directors are C.G . Anderson, merchant, S. R. Anderson, salesman, and W. M. Holtby, contractor, all of Toronto.

The Ideal Brick and Tile Company, Limited, has been incorporated, with a capital of $60,000, to manufacture and deal in brick, tile and pipe, with head office at Brantford. The provisional directors are H. J. Wallace, Gilbert Brereton, real estate agents, and W. H. Fairchild, civil engineer, all of Brantford.

Hill & Strathy Construction Company, Limited, has been incorporated with a capital of $40,000, to carry on a general contracting business, with head office at Toronto. The provisional directors are J. P. Morrish, salesman, E. G. Strathy, and G. A. Hill, brokers, all of Toronto.

Hull Investors Limited, have been incorporated with a capital of $40,000, to carry on business as a general land and building company, with head office at Toronto. The provisional directors are A. K. Goodman, D. G. M. Galbraith, barristers, and W. A. McFarlane, real estate broker, all of Toronto.

Riverview Heights, Limited, have been incorporated with a capital of $100,000, to carry on busines as a general land and building company, with head office at Toronto. The provisional directors are J. T. Campbell, accountant, M. E. Robins, real estate agent, and N. D. Maclean, barrister, all of Toronto.

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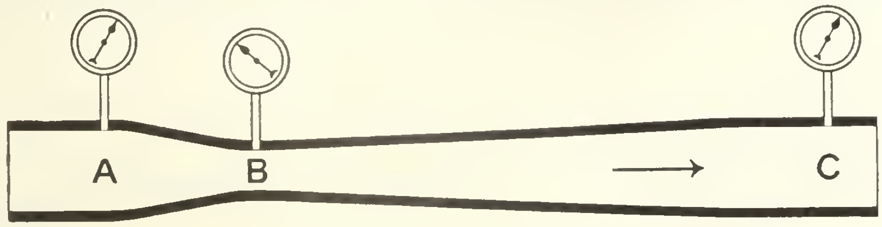

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Gravity Mains The Meter Tube is set in the pipe line similar to a section of pipe. The register can be located several hundred feet away if necessary and it is usually placed in a gate-house or other building already constructed. It may be desirable to erect a small building of brick or concrete, for which suggestions can be furnished.

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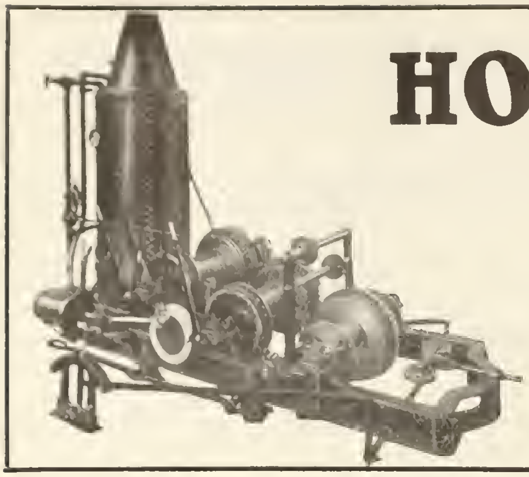

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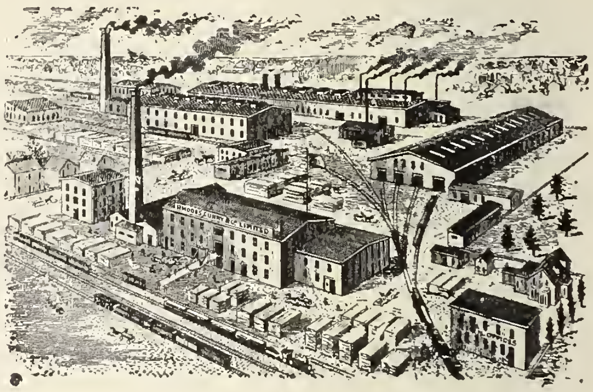

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Builders' Architectural Drawing Self-Taught, by Fred T. Hodgson. Published in 1904 by Frederick J. Drake & Co., Chicago. 262 pages, illustrated. Price 50c.

Architectural Hardwood Finishing, by George Whigelt. Published in 1906 by The Painters Magazine, New York. 124 pages. Price 50c.

Modern Workshop Hints, by Robert Grimshaw, M.E. Published in 1902 by Sampson Low, Marston & Company, London, Eng. 428 pages, illustrated. Price 50c.

Practical House Framing, by Albert Fair. Published in 1909 by Industrial Book Company, New York. 108 pages, illustrated. Price 50c.

Hints for Carpenters, by Albert Fair. Published in 1909 by the Industrial Book Company, New York. 144 pages, illustrated. Price 50c.

Architect, Owner and Builder Before the Law, by T. M. Clark. Published in 1905 by The MacMillan Company, New York. 387 pages. Price $1.00,

Properties of Steel Sections, by John C. Sample, C.E. Published in 1905 by McGaw Publishing Company, New York. 121 pages, illustrated. Price 50c.

American Renaissance (A Review of Domestic Architecture), by Joy Wheeler Dow. Published in 1904 by William T. Comstock, New York. 182 pages, illustrated. Price $1.00.

Modern Plumbing, illustrated, by R. M. Starbuck. Published in 1907 by Norman W. Henley Publishing Company, New York. 329 pages, illustrated. Price $2.00.

Reinforced Concrete, by A. W. Buel. Published in 1906 by the Engineering News Publishing Company, New York. 500 pages, illustrated. Price $1.00.

Practical Hand Book for Millwrights, by Calvin F. Swingle, M.E. Published in 1910 by F. J. Drake & Company, Chicago. 426 pages, illustrated. Price 50c.

Resistance of Materials, by N. de Tedasco and A. Maurel. Published in French, in 1911. 650 pages. Price $1.00.

The Sanitation of a Country House, by Dr. Harvey A. Bashore. Published in 1905 by John Wiley & Sons, New York. 98 pages, illustrated. Price 50c.

Modern Cement Sidewalk Construction, by Charles Palliser. Pub- B. T. Batsford, London. 776 pages, illustrated. Price 50c.

Stones for Building and Decoration, by George P. Merrill. Published in 1903 by John Wiley & Sons, New York. 540 pages, illustrated. Price 50c.

Modern Practical Carpentry, by George Ellis. Published in 1906 by B. T. Batsford, London. 372 pages. Price $1.50.

Light & Heavy Timber Framing Made Easy, by Fred T. Hodgson. Published in 1909 by Frederick J. Drake & Company, Chicago. 396 pages, illustrated. Price 50c.

Building Construction & Superintendence, by F. E. Kidder, C.E., Ph.D. Published in 1906 by William T. Comstock. 298 pages, illustrated. Price $1.00.

Modern Baths and Bath Houses, by William Paul Gerhard, C.E. Published in 1908 by John Wiley & Sons, New York. 312 pages, illustrated. Price $1.00.

Reinforced Concrete—A Manual of Practice, by Ernest McCullough, C.E. Published in 1908 by Cement Era Publishing Company. 126 pages, illustrated. Price 50c.

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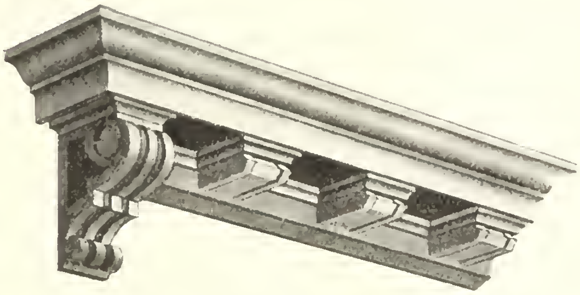

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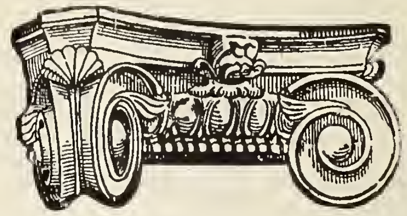

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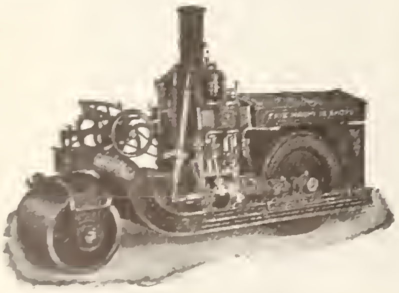

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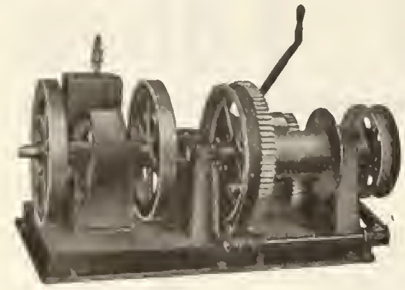

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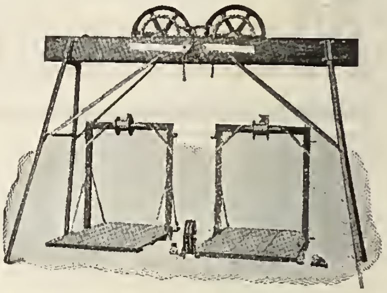

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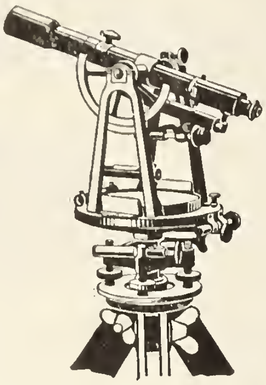

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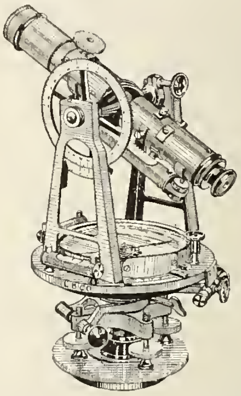

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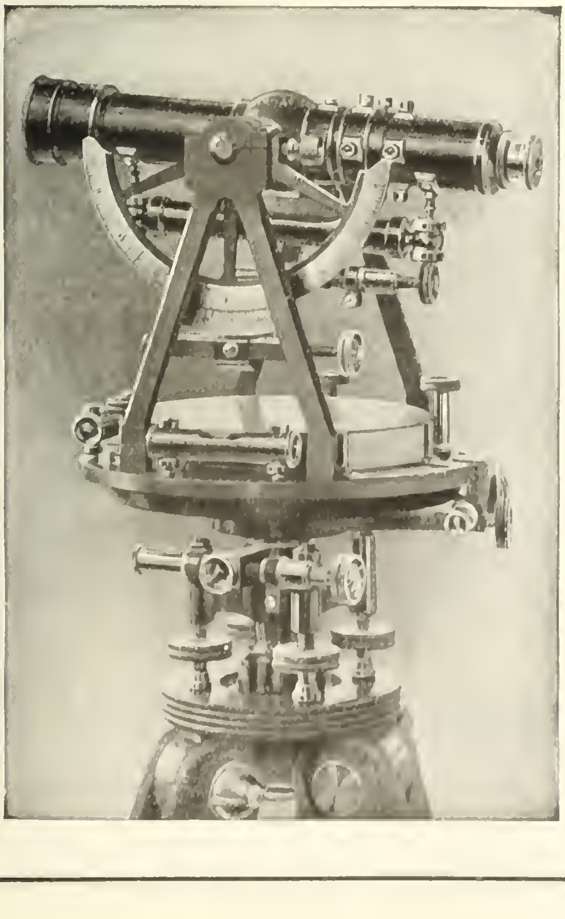

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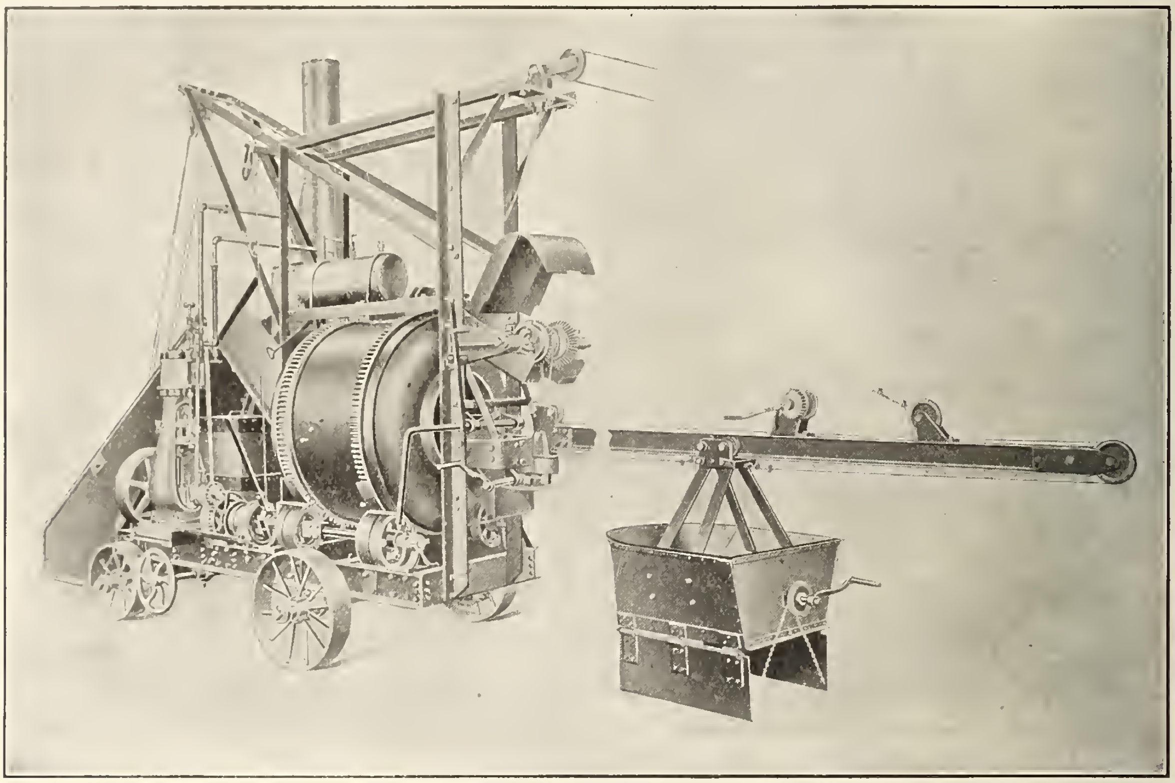

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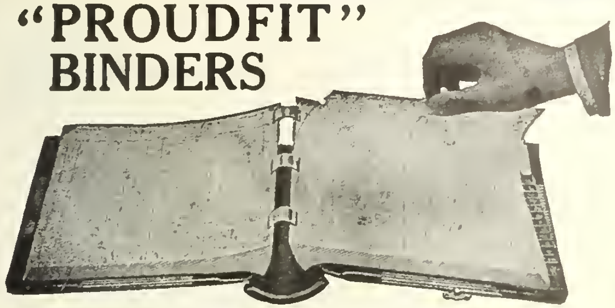

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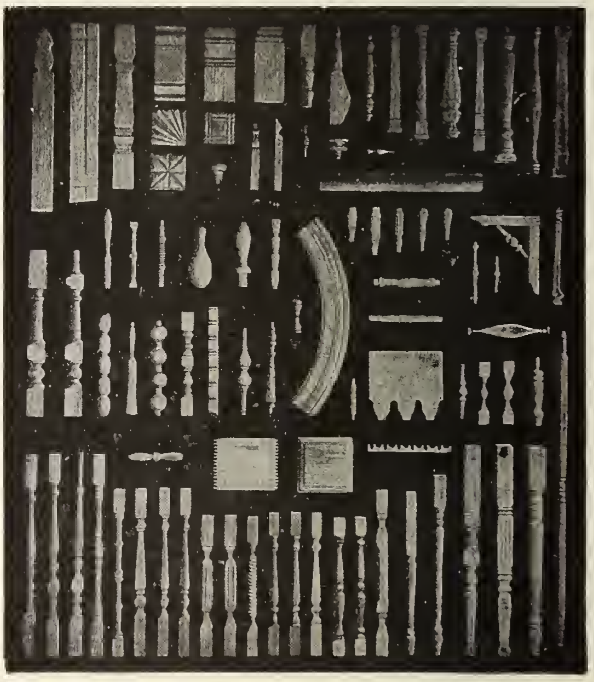

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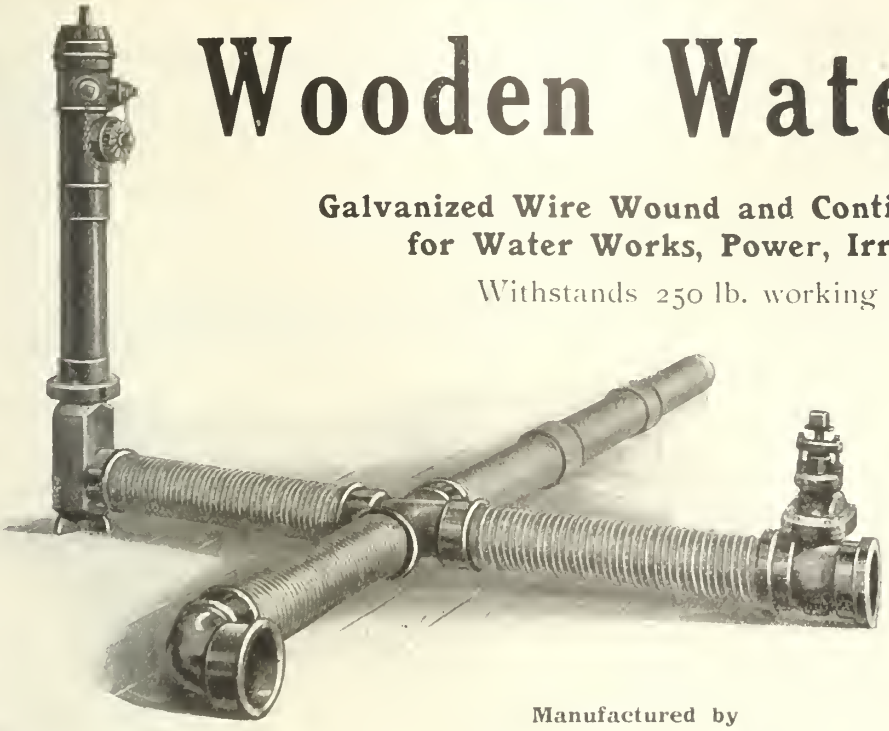

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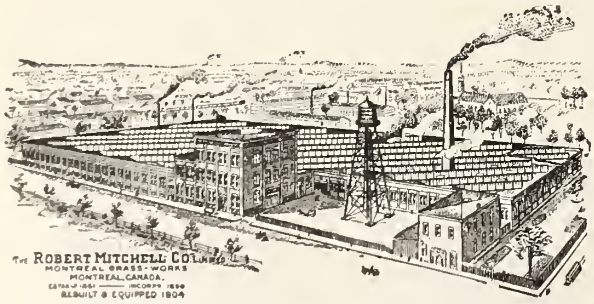

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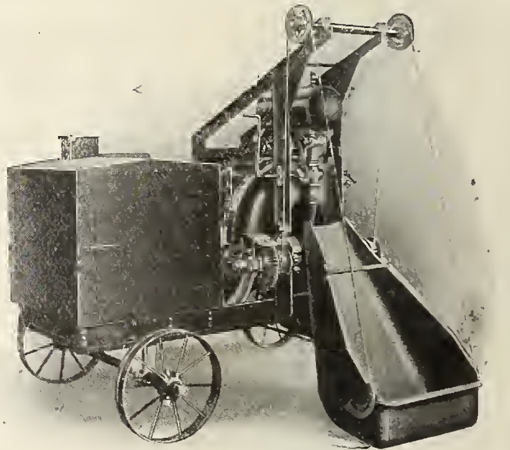

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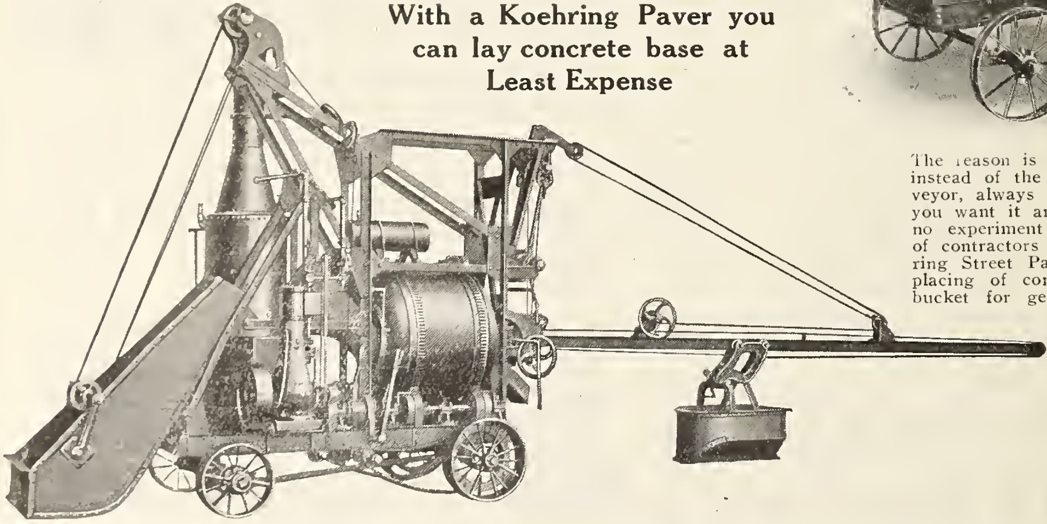

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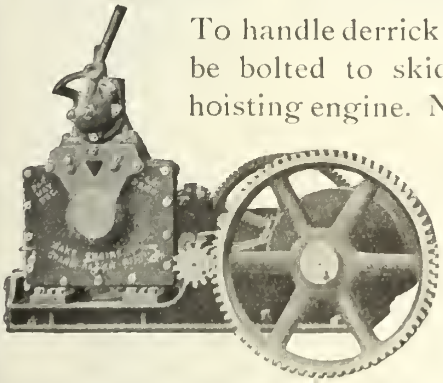

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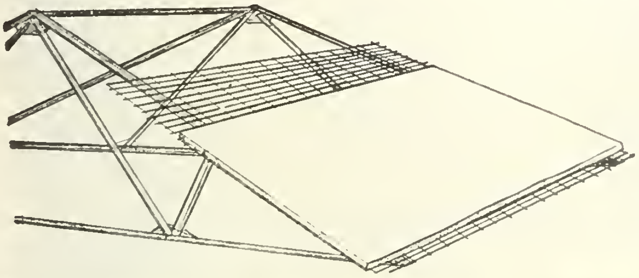

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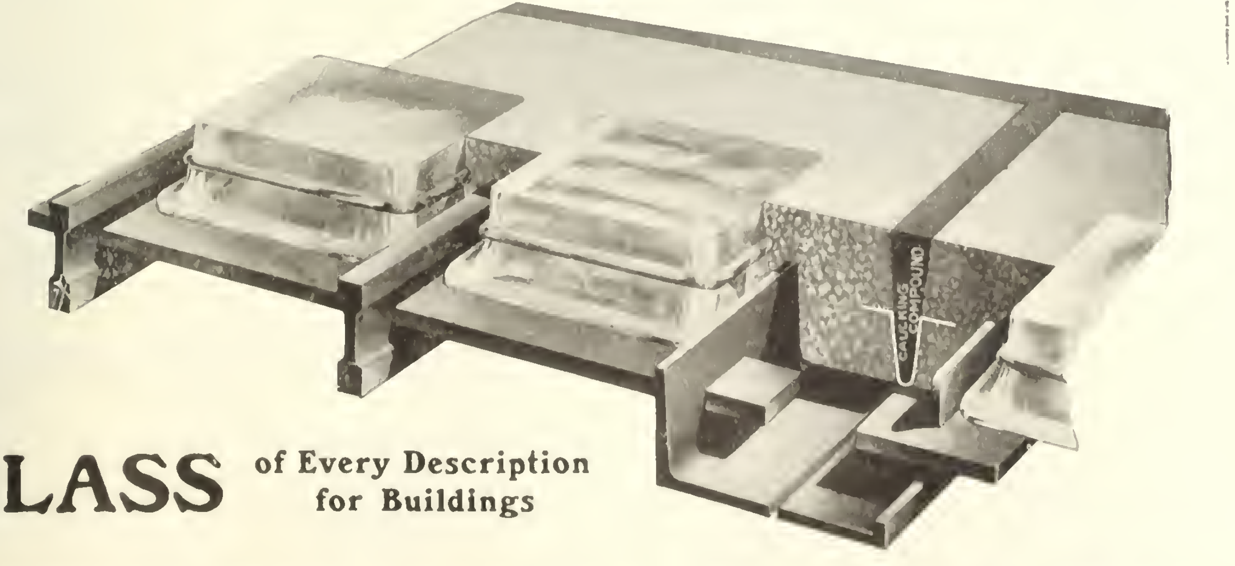

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Herringbone Metal Lath

The ceiling of the Power House of the Toronto General Hospital measures one hundred and twenty yards net. One hundred and twenty-two yards of **Herringbone Lath** covered it completely, waste and lap included.

This is not a record; it is a typical case. The Herringbone selvage edge is the reason.

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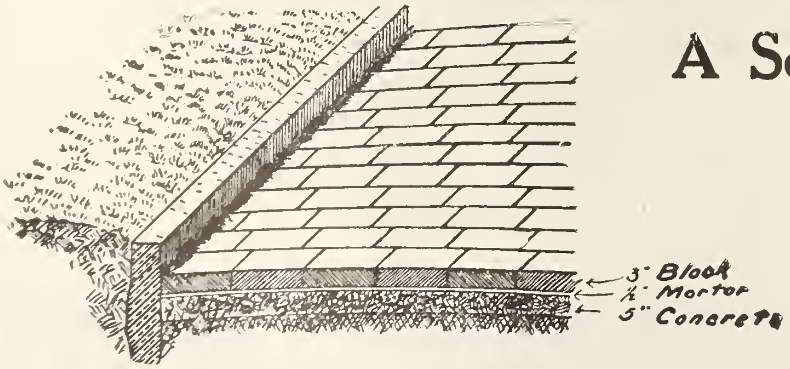

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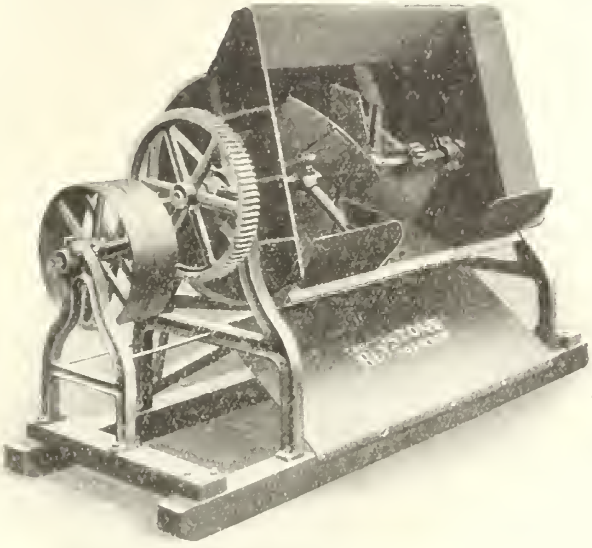

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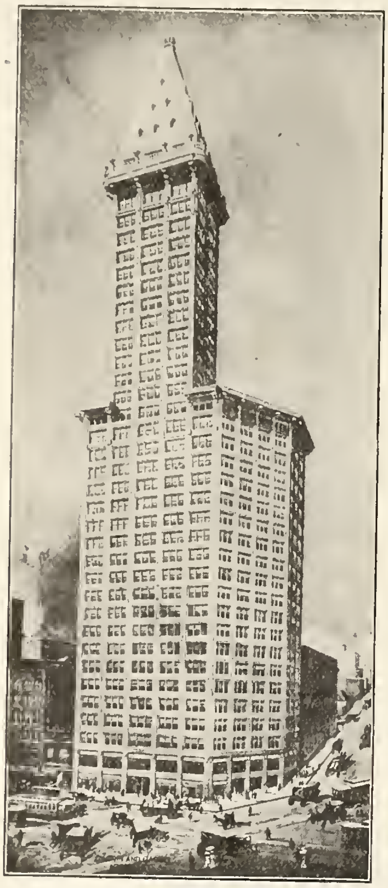

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When a building is structurally fireproof and the possibility of a fire traveling from room to room or floor to floor completely obviated, it is an impossibility for the incipient fire to generate sufficient heat to cause a greater damage than consume the inflammable contents of the room, compartment or unit in which the fire originates.

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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per M
No. 1 dry pressed red brick	$18 00
No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	11 00
Wire cut bricks for foundation work	12 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

LUMBER (Building Material)

Hemlock Lumber—		
2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00
Pine—		
1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pine Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving..	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	
Pine trim for paint finish—		
4 in. casing per 100 ft.	2 00	
5 in. casing per 100 ft.	2 25	
8 in. pine base, per 100 ft.	3 25	
10 in. pine base, per 100 ft.	4 25	
4 in. pine window stool	2 75	
Shingles—		
XXX B. C. Clear Shingles, per M.	3 60	
N. B. Extras	3 50	
N. B. Clears	2 90	
No. 1 pine lath, per M.	4 75	
No. 2 pine lath	4 25	
No. 1 spruce lath	4 00	
Cedar Posts—Fence—		
5 in. at small end, each	25	
7 in. at small end, each	35	
Hemlock lath	3 25	

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 20 per cent. for Star and 25 per cent. for D.D.

	Star	D.D.
10 to 25 united inches	$4 25	$ 6.25
26 to 40 "	4 65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11 00
81 to 85 "	7.00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24 00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D
25	$3.25	$4.75
40	3.45	5.20
50	3.85	6.00
60	4.10	6.50
70	4.35	7.00
80	4.85	7.50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 per cent.

High grade compression work, 55 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 and 10 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.50

Square head brass cocks, 60 per cent.

Lead Pipe

Lead pipe, $7.50 net; lead waste, $9.00 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$2.04	¼ inch	$2.86
⅜ "	2.04	⅜ "	2.86
½ "	2.72	½ "	3.57
¾ "	3.16	¾ "	4.31
1 "	4.54	1 "	6.19
1¼ "	6.19	1¼ "	8.44
1½ "	7.43	1½ "	10.13
2 "	9.90	2 "	13.50
2½ "	15.80	2½ "	21.56
3 "	20.75	3 "	28.31

Malleable fittings—Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 67½; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 and 10 per cent.

Plain steel bars, $2.05.

Square twisted bars, ¾ to 1¼, $2.15.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 65 per cent.

7 and 8-inch pipe, 50 per cent

Sewer Pipes

4-in.	25c ft.	15-in.	1.35 ft.
6-in.	40c ft.	18 in.	1.90 ft.
9-in. .. .	65c ft.	20 in.	2.25 ft
12 in. . .	1.00 ft.	24 in.	3.25 ft.

all less 60 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1 80.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.55.

Crushed stone, 2 inch, $1 30; 1 inch, $1 35; ¾ inch, $1 45.

Burnt River rubble stone delivered, $15 to $16 per toise

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard

Grey coursing stone, delivered, $2 25 to $2 50 per yard.

Sand, for cement or brick work, $1 15 a yard, f.o.b. cars, Toronto siding

Brown sills and heads, in the rough, delivered, 40 cents per foot.

Rubble stone in car lots, $1 30 per ton

Steel channels and beams, $2 65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

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Manilla Rope, best, per pound, 12½ cents

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Pure White Lead, ground in oil, $9.00 per 100 lbs.

Boiled Linseed Oil, in barrels, 78c per gallon.

Raw Linseed Oil, in barrels, 75c per gallon.

Turpentine, in barrels, 60c per gallon.

Pure Red Lead, dry, $7 to $8 per 100 lbs.

Putty, pure linseed oil, in bulk, bbls., 3½c.

Putty, pure linseed oil, in 25 lb. tins, 4c.

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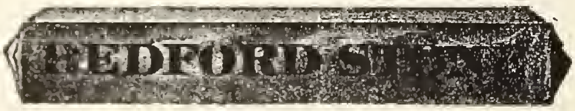

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Positively the best all round Horse Liniment made.

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A sure and speedy cure for all kinds of Colic

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4 oz. tins	3.50 doz.

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OF ALL DESCRIPTIONS

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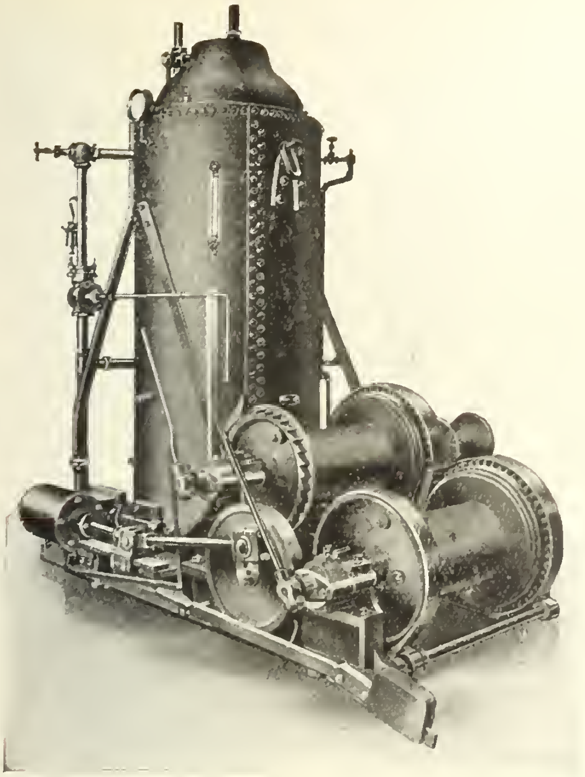

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This is the most improved type of Hoisting Engine used for general hoisting purposes and is especially adapted to pile driving, bridge building, quarries and general derrick work.

The drums contain the latest improved friction, and being absolutely independent in action, make the entire outfit indispensable where loads are to be raised and lowered with rapidity.

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They combine strength of construction with simplicity, compactness and ease of operation. Absolutely "fool proof" they can be left in charge of an unskilled laborer and will work the full shift without a stop.

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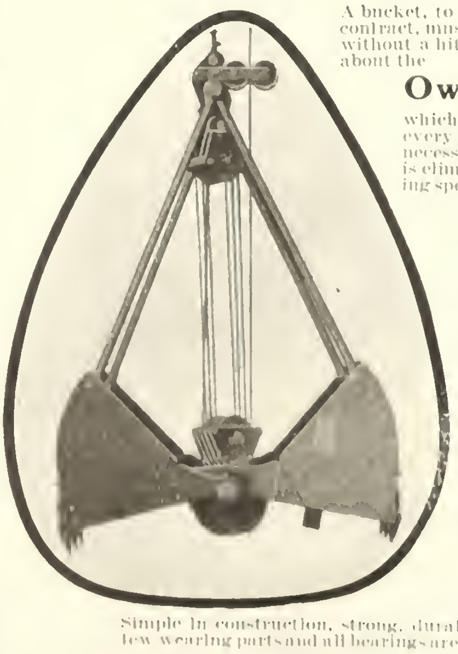

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Simple in construction, strong, durable, has few wearing parts and all bearings are bushed

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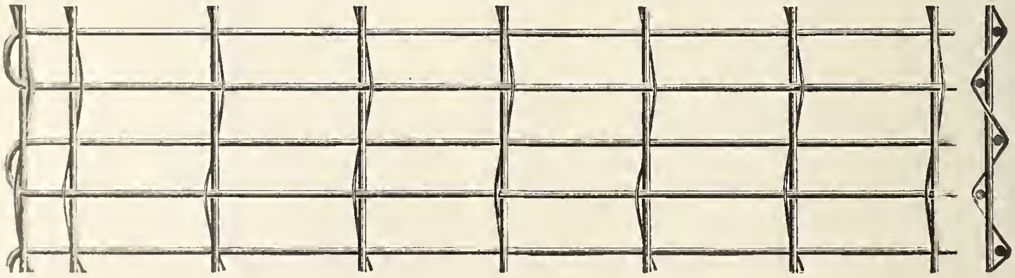

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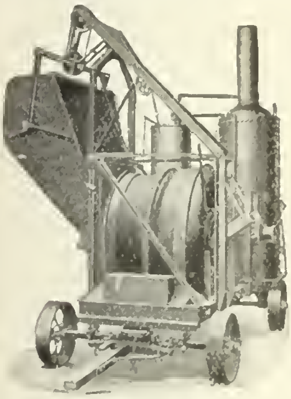
IN MILWAUKEE there were about twenty concrete mixers sold in 1911, and fourteen were **Chain Belts.** Six of the leading concrete mixer concerns have their plants in Milwaukee. Draw your own conclusions, Mr. Contractor.



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Where there is big construction work you will generally find a **Chain Belt Mixer** on the job. You owe it to yourself to investigate the **Chain Belt** before placing your order.

We also make elevators and gravity distributing systems. Send to-day to any of our agents for information.

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Milwaukee, Wis.

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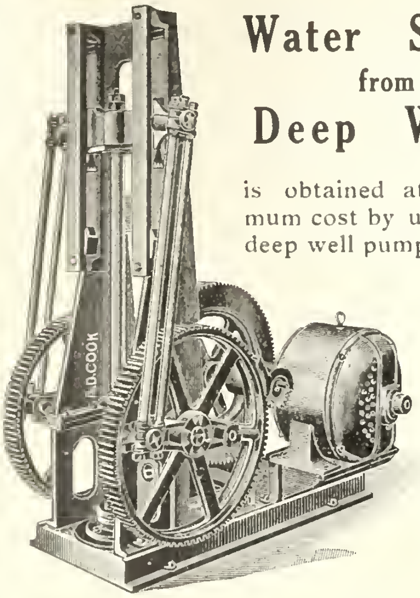

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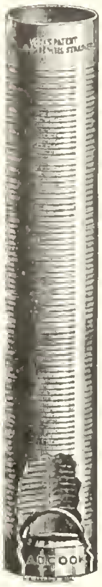

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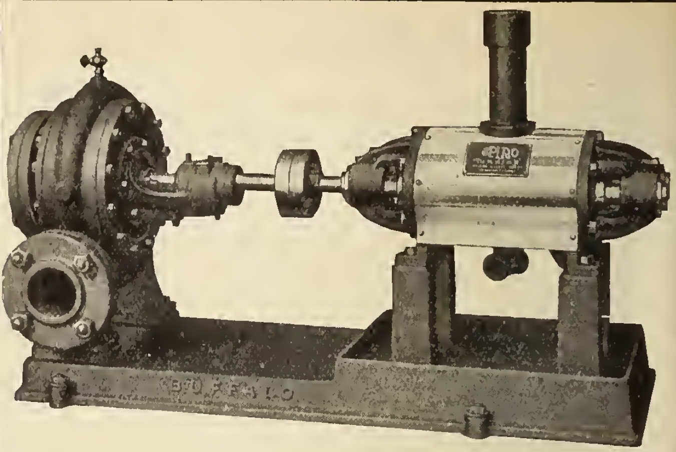

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Vol. 26 Toronto, November 13, 1912 No. 46

ESTABLISHED 1886

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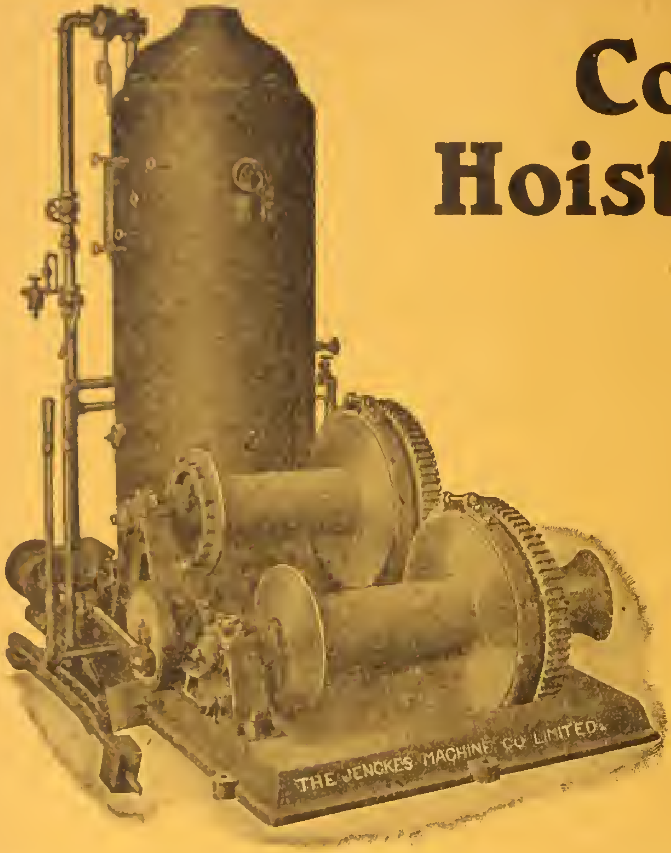

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The cost of keeping a mile of macadam road in good condition for one year will pay for the maintenance of $166\frac{2}{3}$ miles of concrete road for same period.

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The engineers of our Free Information Department will gladly supply any information on concrete highways that is desired, without cost or obligation to the enquirer.

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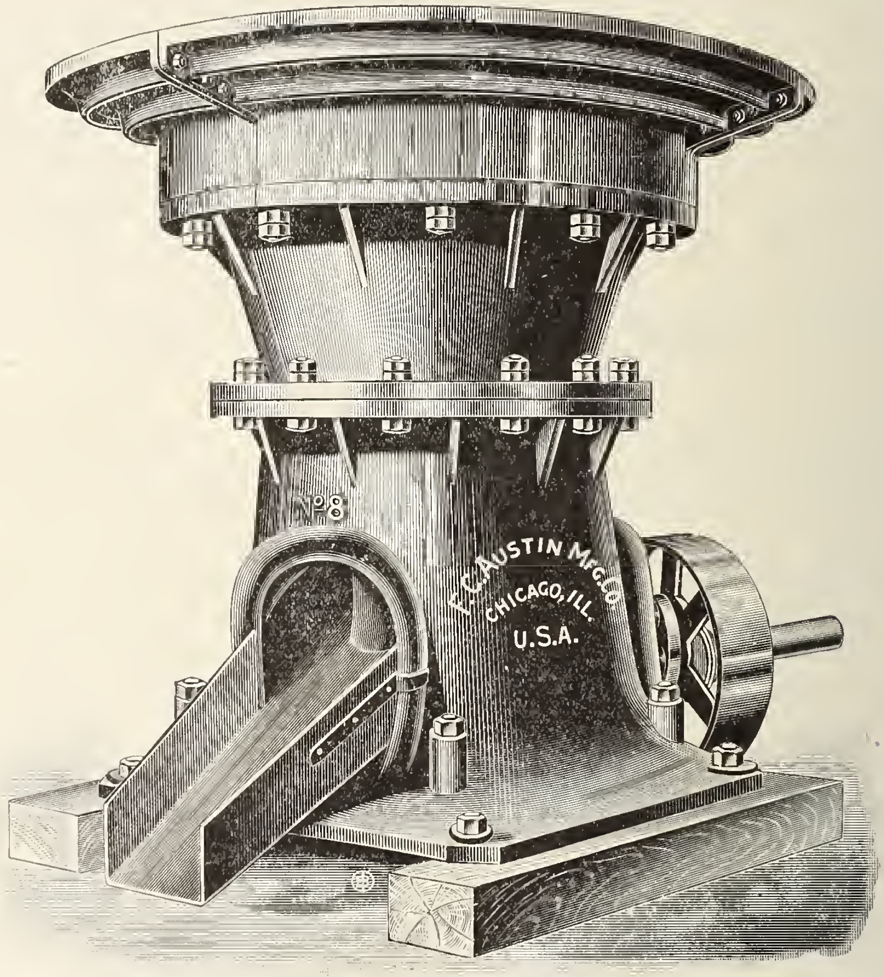
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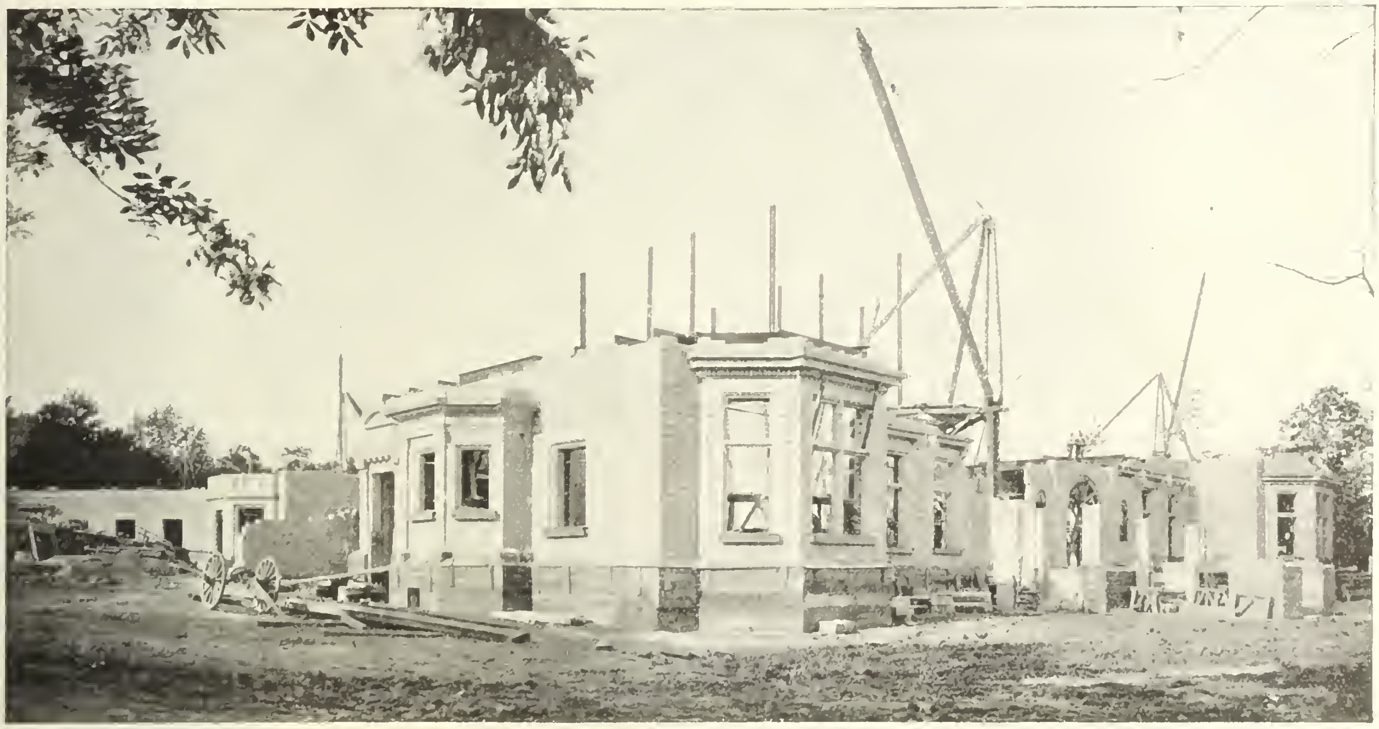

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Don Valley Brick and Porous Terra Cotta used throughout.

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are used in the construction of the most important public buildings erected by the Provincial Government. They are specified by the leading architects for every building of importance. The latest example of the public recognition of their superiority is found in their use for the new Toronto Residence of the Lieutenant Governor of Ontario. Don Valley Bricks possess a beauty of color and an even texture and form which add that touch of distinction to a building that characterises it as fulfilling the essentials of decorative dignity.

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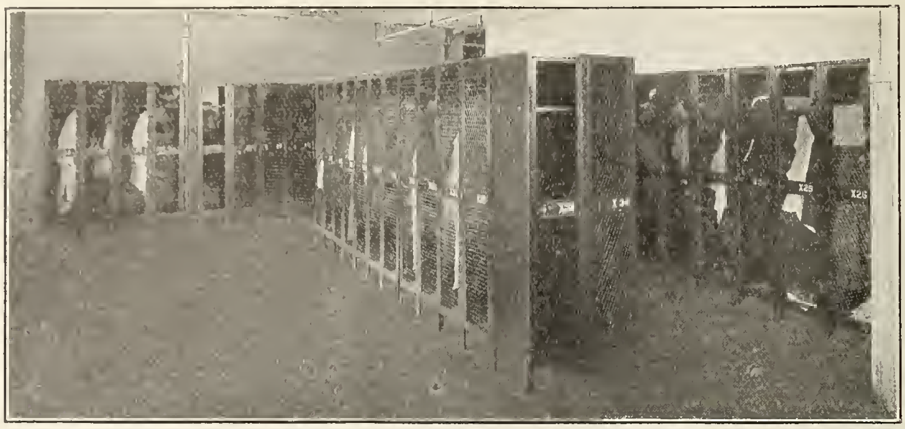

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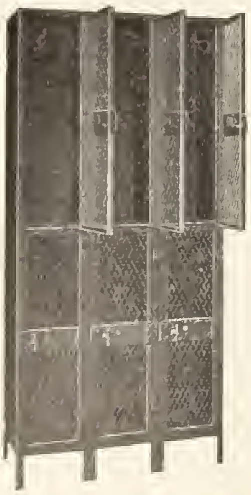

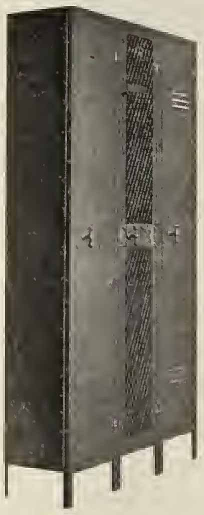

"Steelcrete" Steel Lockers

form a new type of safety lockers carefully thought out and designed and containing many advantages over the usual class of metal cage hitherto in use. These lockers are made all steel and are particularly suitable for

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Steelcrete Steel Lockers are finished in olive green enamel and are exceptionally **neat** in appearance, **clean and sanitary,** and **solid** as a block of wood. They are constructed throughout of the finest high-grade steel and are unequalled for their Strength and Rigidity.

The Standard Sizes and fittings, etc. are carefully calculated to meet every ordinary requirement.

Made in "Single Tier" or "Double Tier" with sheet steel or expanded metal (open mesh) doors—combination locks or padlocks instead of rim locks if desired.

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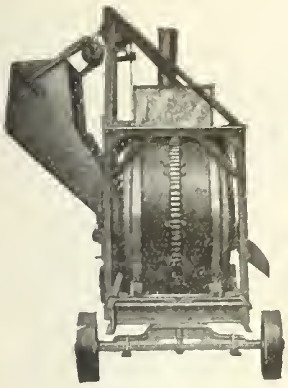
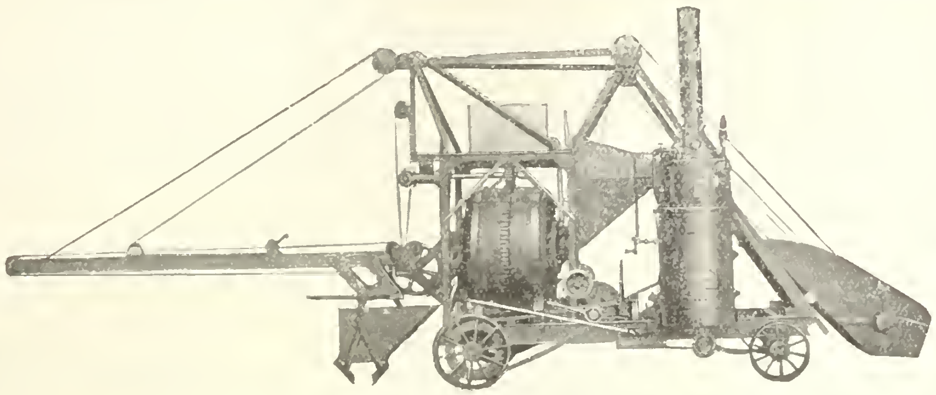
STEEL and RADIATION, Limited

TORONTO, CANADA



London Standard Drum Batch Mixer



London Street Paving Mixer with Front Board and Delivery Boom

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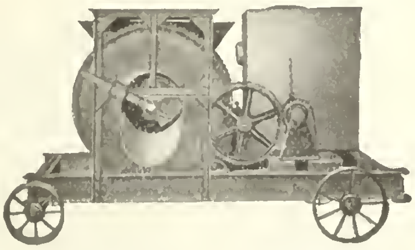

London Standard Drum Batch Mixer

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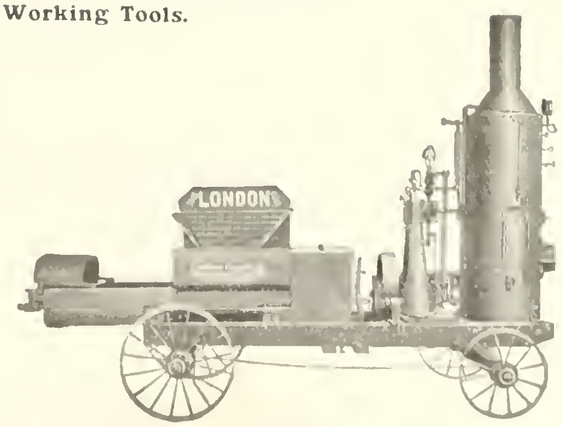
And a complete line of Cement Working Tools.

London Mortar Mixer



London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

AGENTS:

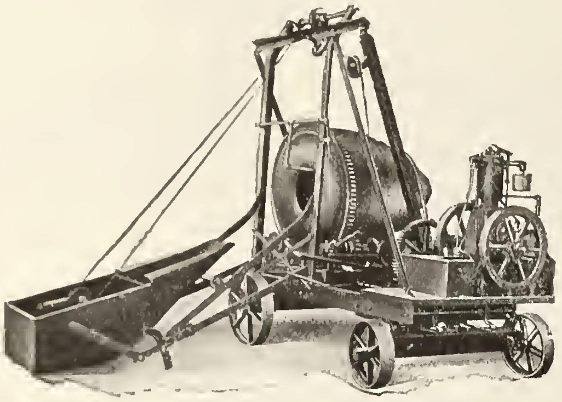
Toronto Office, 60 Richmond St. W.
Winnipeg Office, 445 Main St.
The Foss & Hill Machinery Co., Montreal, Que.
G. B. Oland, Halifax, N. S.

Calgary Office, 622 9th Avenue West
B. C. Equipment Co., Vancouver, B. C.
General Supply Co. of Canada, Ottawa, Ont.

We are the Largest Manufacturers of Concrete Machinery in Canada

For Any Rush Job

You Are Forced to Admit



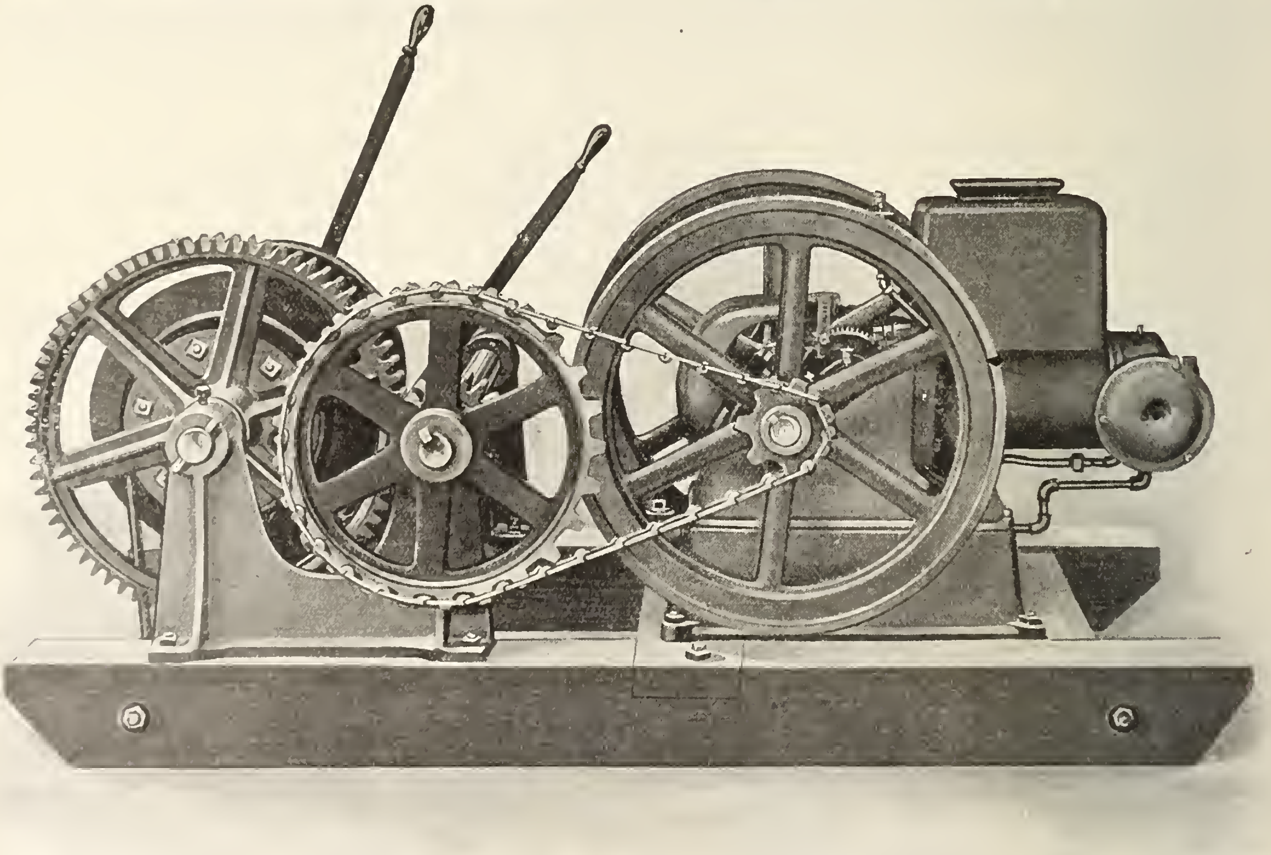
Wettlaufer No. 1 Heartshape Mixer

that

The Wettlaufer Improved Heartshape Mixer

will stand up to the work and see the job through with a certainty of good results that you can absolutely rely on. It will make yours a more profitable job by doing quick and perfect work with no stops for repairs.

Automatic operation—low running cost
Economical working throughout



Wettlaufer Single Drum Hoist No. 1

The most useful and complete hoist for all building and contracting purposes. Its compactness, size and general handiness give it great advantages over the ordinary large cumbersome hoist and enable it to be easily moved around from one part of the job to another. Its capacity for work and general utility are unlimited.

Let us send you particulars of our Hoists and Mixers—or come and see them. Continuous Demonstrations at

WETTLAUFER BROTHERS

TORONTO

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15 Dock St., St. John, N. B.

Lavallee Ross, Limited
Alexandra Block, Howard Ave.
Edmonton, Alta.

Hooton & Moore
613 Ashdown Block,
Winnipeg, Man.

MONTREAL OFFICE and WAREROOMS : **316 Lagauchetiere St. W.** **Head Office: TORONTO, Ont., 178 Spadina Ave.**

ROGERS

Steelcrete

The most perfect system of concrete reinforcement on the market. Expanded Metal Cold Drawn—gives maximum stiffness, strength and high elastic limit.

ROGERS

Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

All

Fire Proofing Material

used by the

Building Trade

supplied by

ALFRED ROGERS LIMITED

28 King St. W., TORONTO, Ont.

N. J. Dinnen & Co.

WESTERN SALES MANAGER

WINNIPEG

Man.

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery — Send your orders for crushed stone to

ROGERS

French Caen Stone Cement

Monarque Brand and Cementaline. Rich in appearance and of unlimited durability, as good as natural stone—but cheaper. Full particulars of

ROGERS

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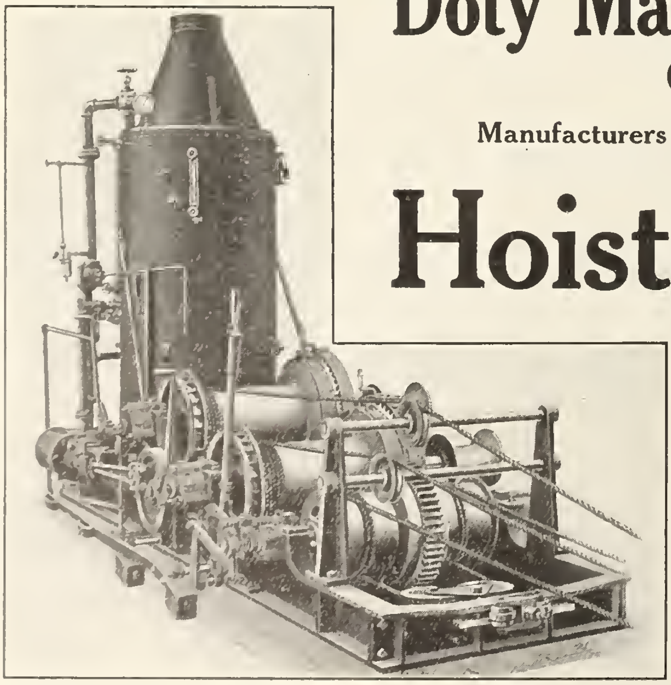


The
Doty Marine Engine & Boiler Company Limited
Manufacturers of Superior
Hoisting Engines
Derrick Swingers, Material Elevators, etc.
for
Contractors, Mines and Quarrymen

A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

Works—GODERICH, ONT.

To buy our Engines is a Guarantee of Satisfaction

This cut illustrated our Standard Double Cylinder Double Drum Hoisting Engine with Derrick Swinger attached. "Superior to any other on the market." All parts constructed, guages and templates and every engine tested under steam.

Sawyer Belt will stand any weather

Exposure is the cause of many belting troubles. Neither leather or rubber belting, though expensive will stand both rain and shine.

Here is where **Sawyer Canvas Stitched Belt** shows its superiority. The compound in which it is immersed renders it pliable under all conditions.

It costs less—It wears more.

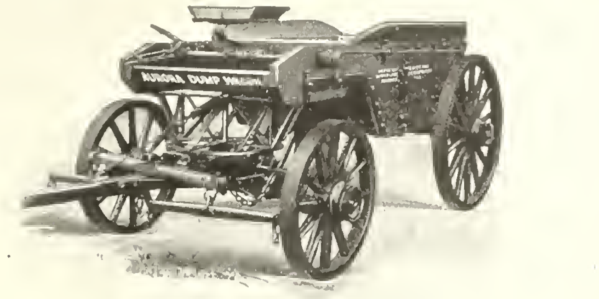
Try it in rain or shine

Sawyer Belting Co.

Cleveland, Ohio

THE STRENGTH OF OAK WITH 40 PER CENT SAVING IN WEIGHT

That's the saving effected by constructing the bed of selected Washington Fir, and its just one of the many reasons why lightest weight is combined with greatest strength in the



"Aurora" Dump Waggon

Built low for easy loading, coupled short for lightest draft only 7 feet 4 inch wheel base.

Chains entirely outside of bed, direct pull of chain on doors and length of chains adjustable.

Slotted hinges on doors give vertical movement, preventing installing team on dump.

Study its sturdy construction—its mechanical, labor-saving and dependable qualities. Catalog for the asking.

Western Wheeled Scraper Co.

AURORA, ILL.

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS

1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

Total $376.17 or $5\frac{2}{3}$c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.

Hagersville, Ont. Limited

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  - Provincial Steel Company
  - Reid & Brown
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  - Steel Co. of Canada
- Wood Turnings
  - Automatic Wood Box & Turning Company

"PIONEER" ASPHALTS

"PIONEER" Highest Quality ASPHALTS
TRADE MARK

The 16 year record of "PIONEER" ASPHALTS is the best assurance an Engineer can have as to their efficiency, permanency and economy. Specify "PIONEER" ASPHALTS

For Asphalt Macadam Roads, Asphaltic Concrete, Sheet Asphalt Paving—and Filler for Brick and Block Pavements

and results will be highly satisfactory. "PIONEER" ASPHALTS are 99.5 per cent. pure bitumen. They are waterproof and weatherproof. Can be used for all purposes where an asphalt can be used.

Write for Specifications

THE CANADIAN MINERAL RUBBER CO., Ltd.

Canadian Express Building, MONTREAL
503 Canada Building, WINNIPEG

Tarvia

Preserves Roads
Prevents Dust~

Section of Government Parkway, Ottawa, Canada, treated with Tarvia B

The Property Owner's Investigation

IN the City of St. Thomas, Ont., the property owners on Gladstone Avenue contemplated petitioning the City Council to improve the roadways. They commissioned one of their number to visit various American cities, inspect pavements and make a report. Their investigator, Mr. E.A. Horton, visited various cities in New York and New Jersey. In his report he made the following statements:

> "I saw a 'Tarvia X' road in Rochester which extends from the city to the lake front, a distance of about six miles. It had been in use for eighteen months, and when I saw it, it was in excellent condition, with heavy traffic over it every day. I........inspected a piece of road in Newark......the surface when finished was smooth, and to my mind was one of the finest pieces of road it was my privilege to see. We then inspected another piece of "Tarvia X" which had been done by the Road Commission two years ago -———Constant heavy traffic passes over this road every day, and trucks have loads of from 6 to 8 tons. Steel tired drays were used with most of their heavy traffic This piece of road, as I saw it, did not show any wear whatever, and was apparently in as good condition as when it was put down.
>
> "I did not confine my attention to Tarvia roads as I saw (here he mentioned five of the commonest types of road treatment) and every other kind of road that is known.
>
> "I must say after making enquiries from people who were in no way interested, nor did they know I was seeking information, that everyone had a good word to say for the Tarvia road I have no hesitation in recommending it for use on our street, and at the estimate cost that has been given us, after seeing the many pieces of road that I have seen, I think it is the cheapest road that can be built.'

The foregoing is quoted from the St. Thomas, Ont., Journal of February 20th, 1912. Since that date Gladstone Avenue has been constructed with "Tarvia X."

Anyone who will investigate the road problem with the same thoroughness will reach similar conclusions Tarvia is made in three grades:

"Tarvia X" for use in constructing roads and pavements

"Tarvia A" for hot surface applications.

"Tarvia B" (applied cold) for dust prevention and road preservation.

Booklet describing the latest developments in methods for building tarviated roadways and pavements will be sent free on request. Address our nearest office.

THE PATERSON MANUFACTURING CO., Limited

MONTREAL TORONTO WINNIPEG VANCOUVER

The Carritte-Paterson Manufacturing Co., Limited, St. John, N.B., Halifax, N.S.

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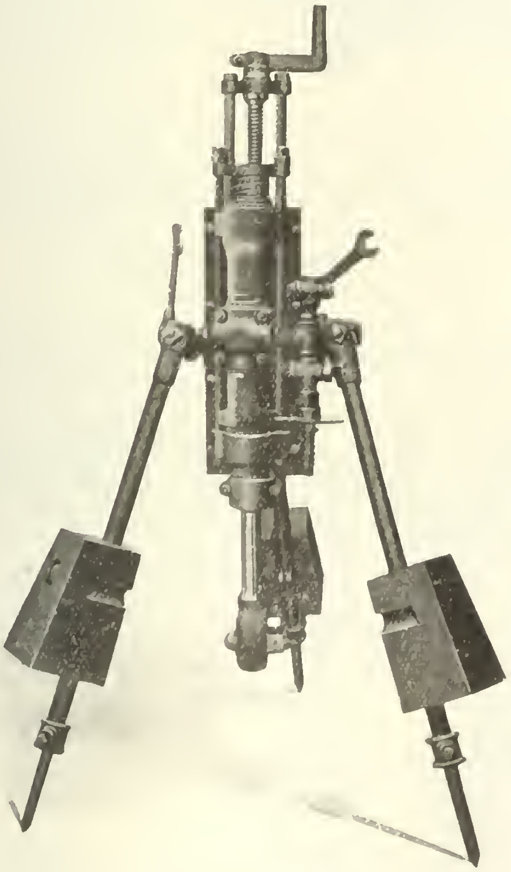
NAPANEE ROCK DRILLS



Contractors and Engineers who wish to secure increased efficiency and lower costs in rock drilling should investigate the Napanee Rock Drill and its latest improvements.

In stock in Montreal and Napanee, and at work at places too numerous to mention here.

For Information and Prices please address our sales Managers:
Lecky & Collis, Napanee, Ont., and 335A Craig St. West, Montreal

NAPANEE IRON WORKS, LIMITED
NAPANEE :: ONTARIO

Contractors' Acetylene Flare Lights

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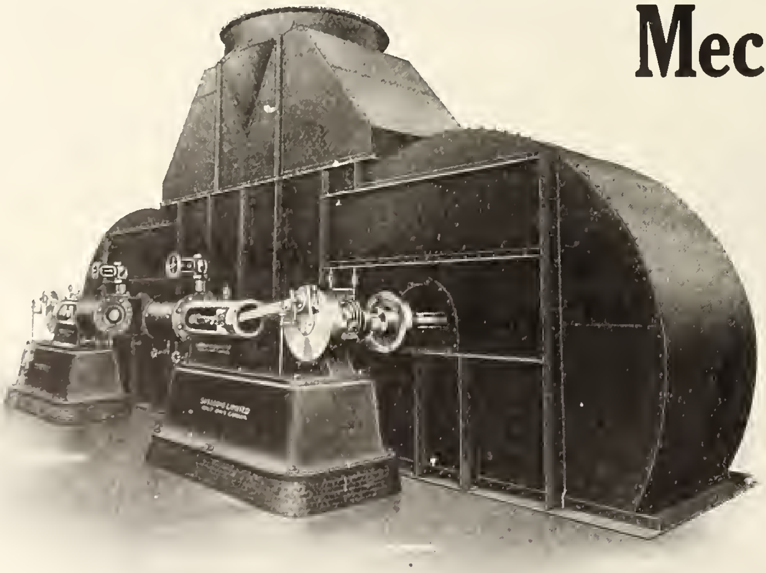

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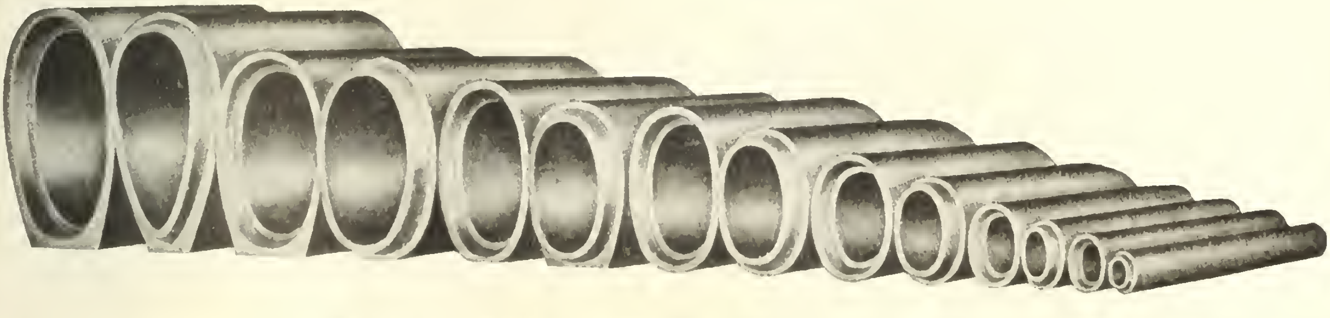

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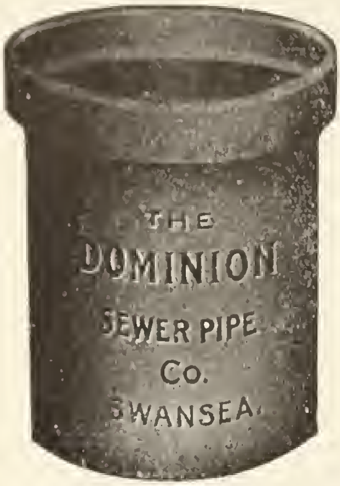

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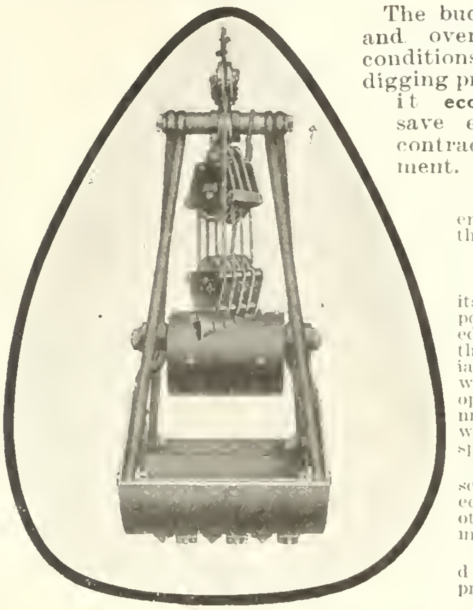

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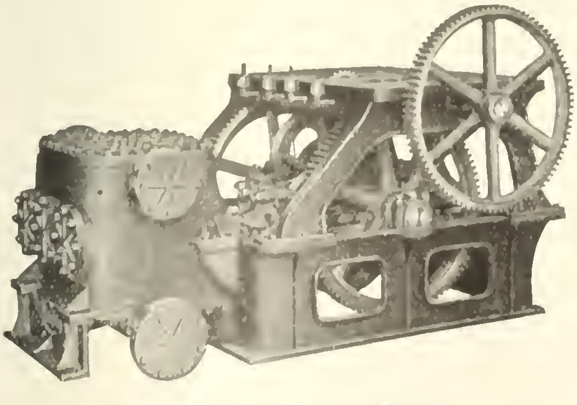

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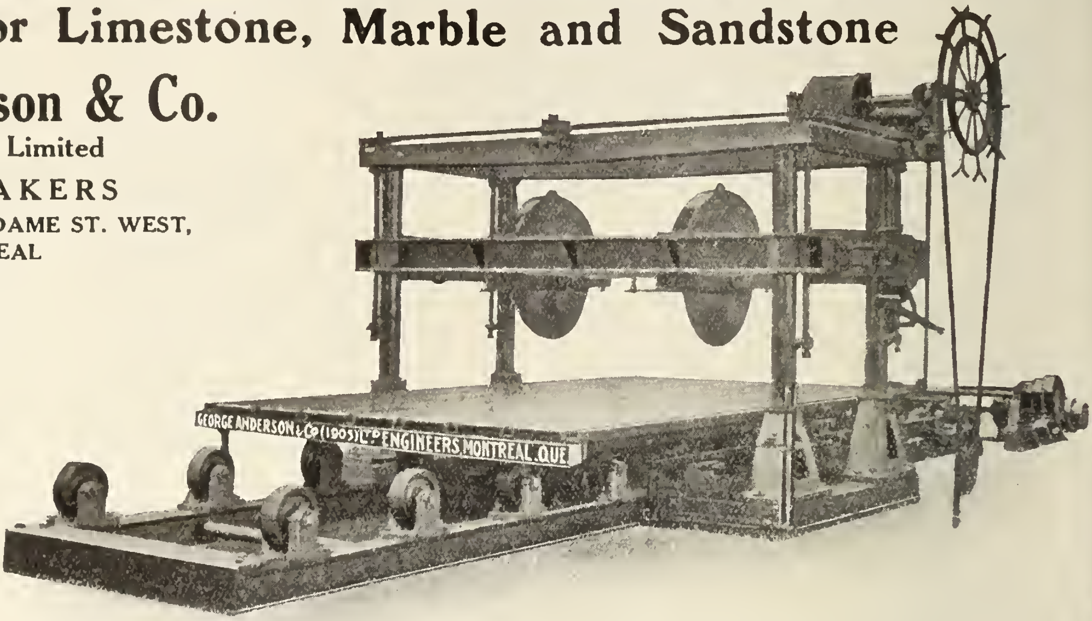

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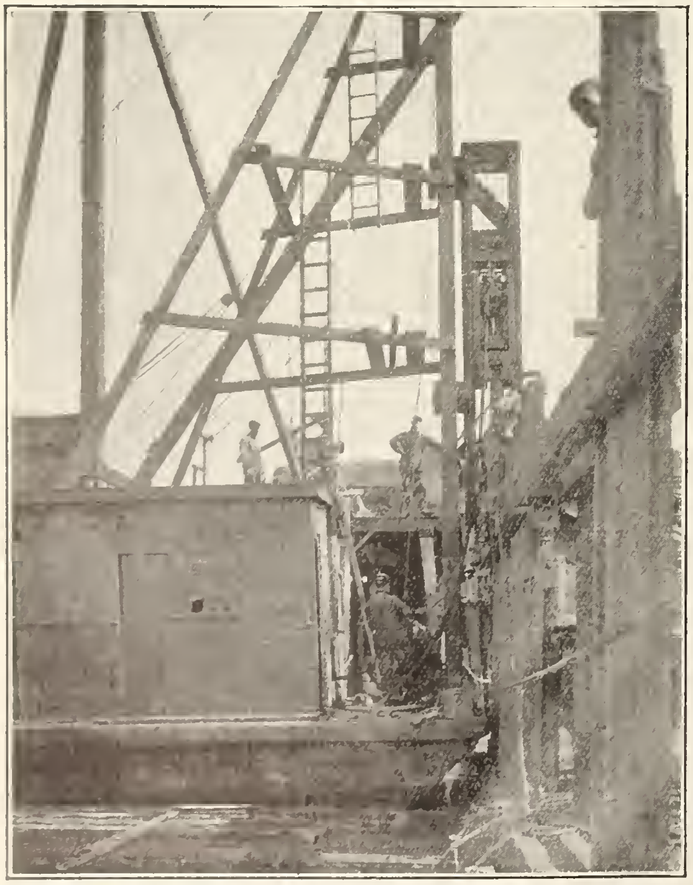

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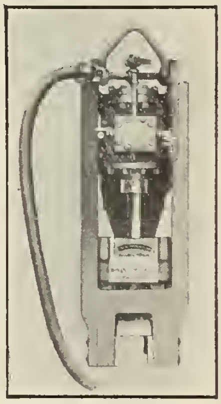

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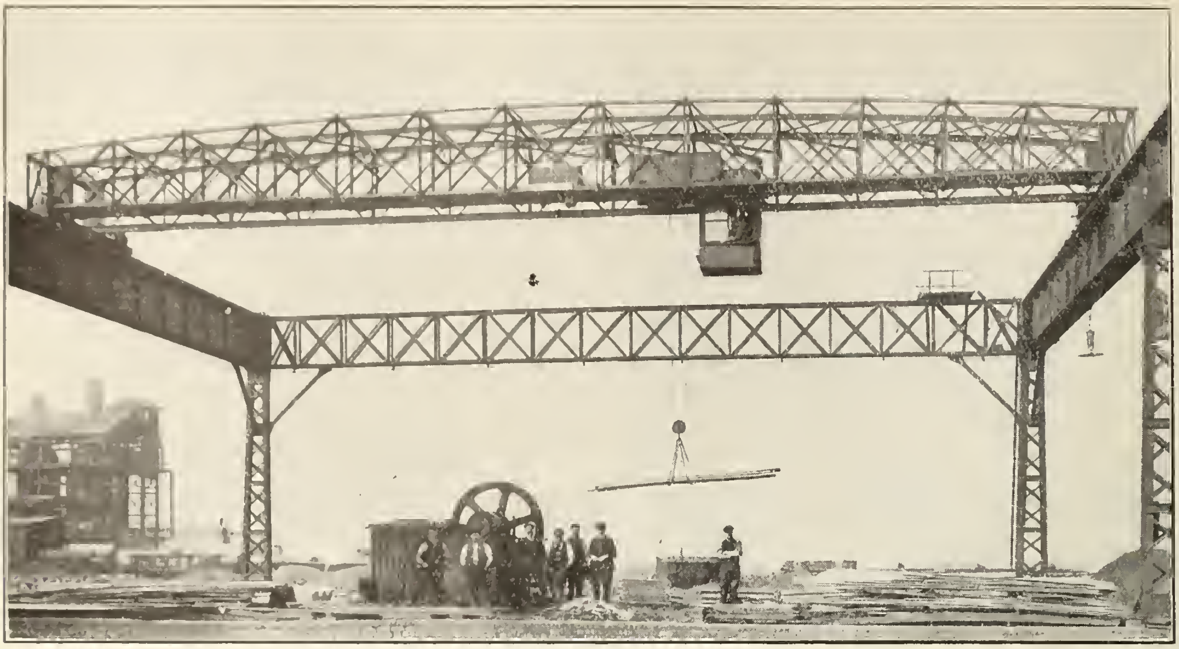

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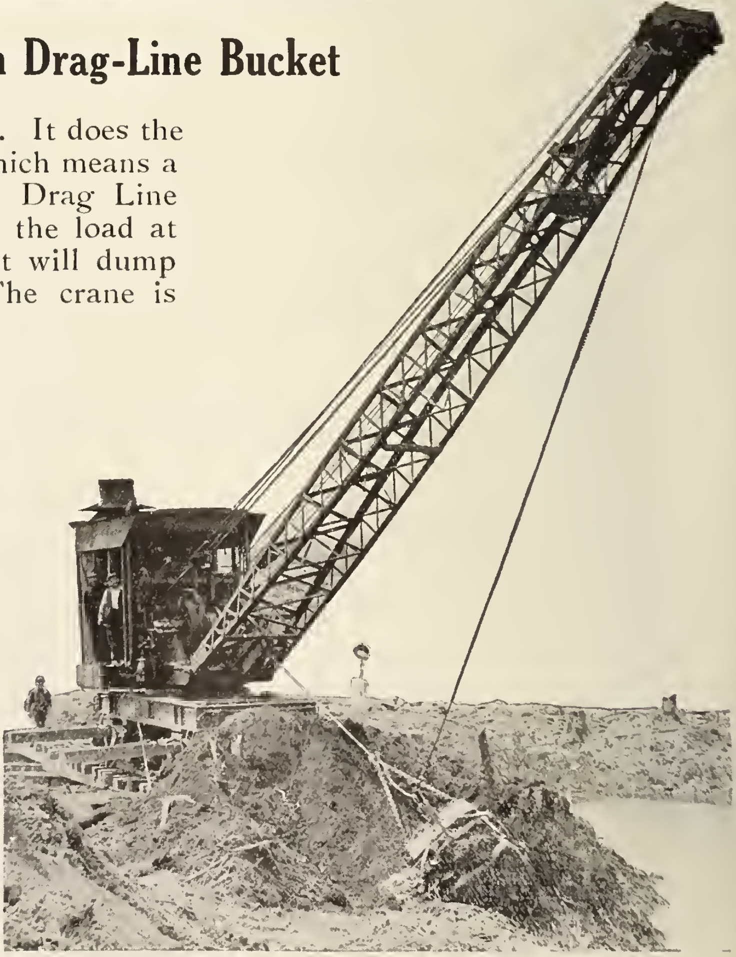

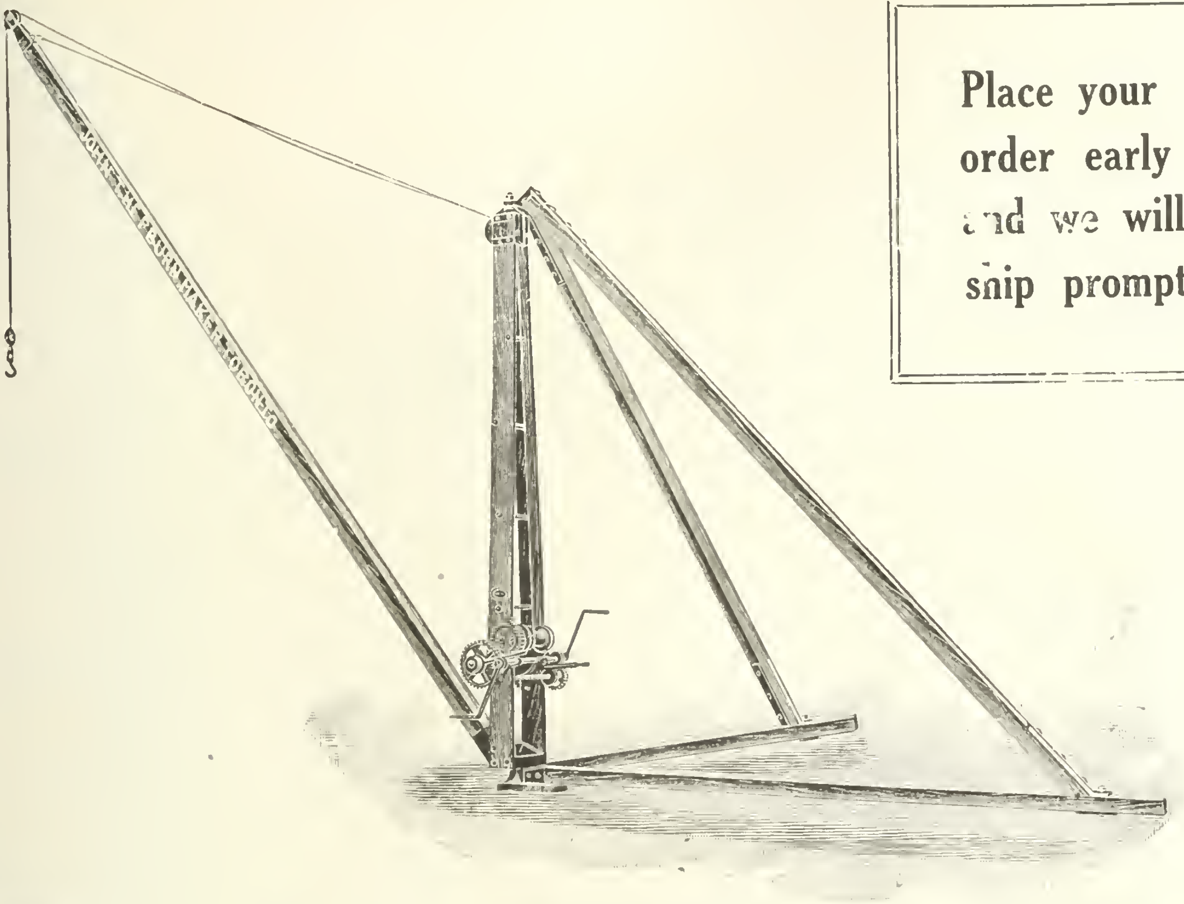

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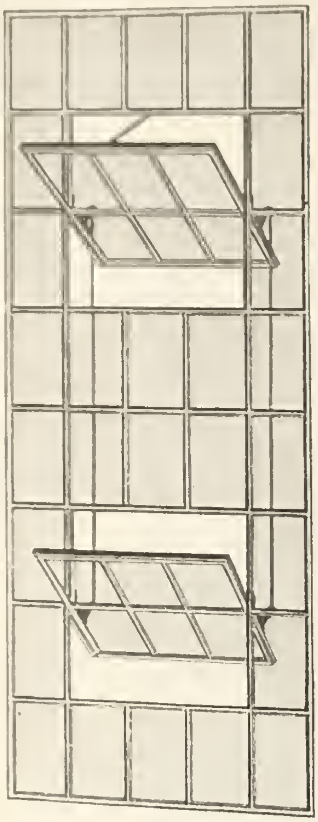

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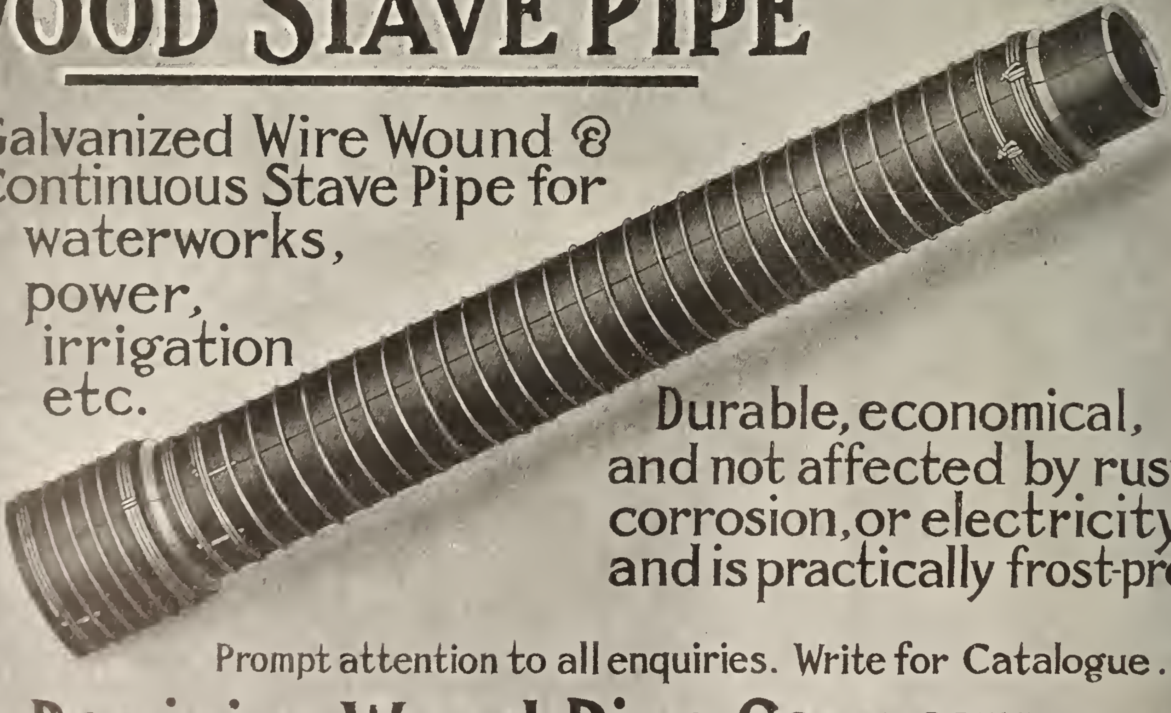

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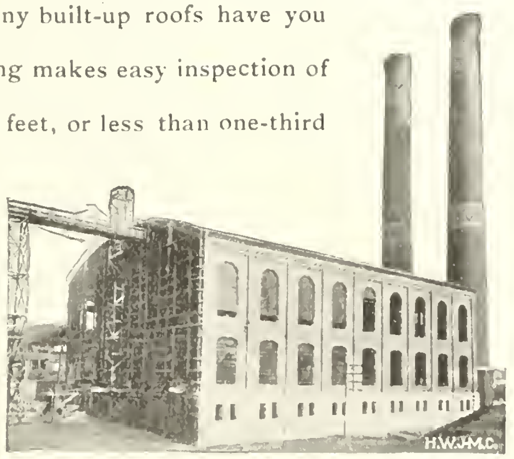

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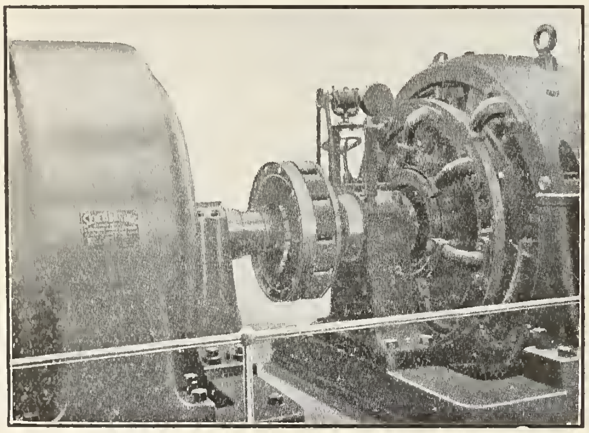

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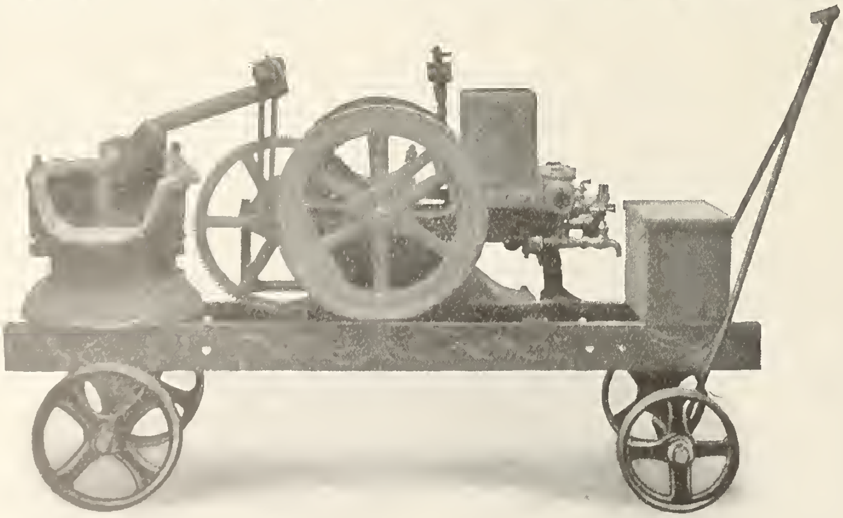

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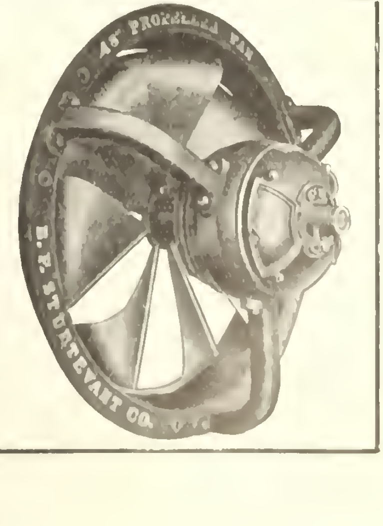

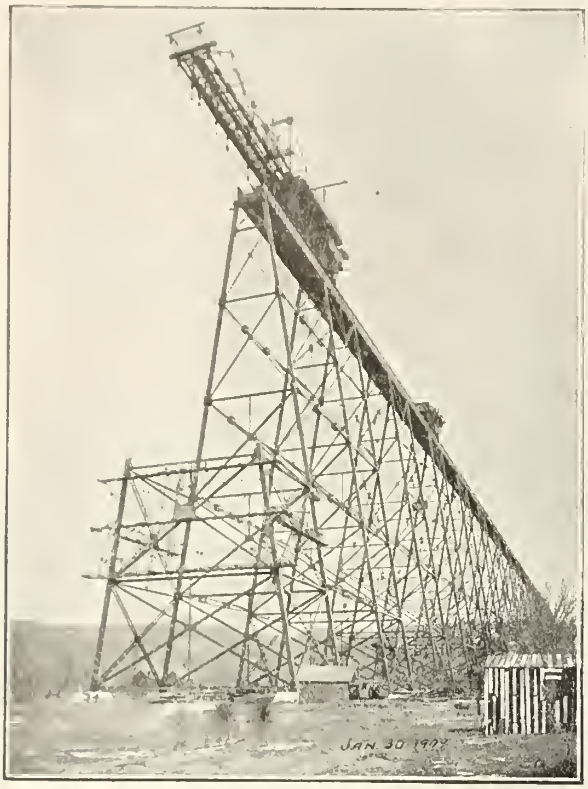

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It is built up, layer upon layer, of close-woven, long-fibre, cotton fabric, rubberized and cured under Goodyear processes. And every Goodyear belt has in it the lowest possible minimum of stretch, because the belt is "cured" whilst stretched to the limit of safety in a special machine.

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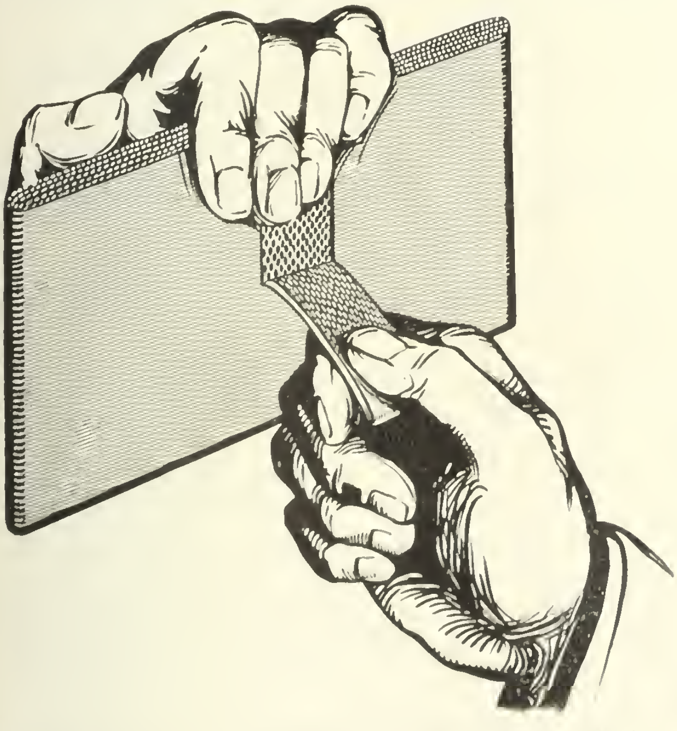
And the result is entirely satisfactory to belt users—a fact to which our enormously increased sales testify. What is the significance of this CONTINUED SALES INCREASE—50% over last year? Simply that Goodyear Belting more than fulfills the claims made for it by the Goodyear people—who know what a belt should do, and make a belt to do it.

It has cost us less than $200.00 for claims or adjustment of every kind in connection with our total output for the past two years—a remarkable tribute to Goodyear reliability.



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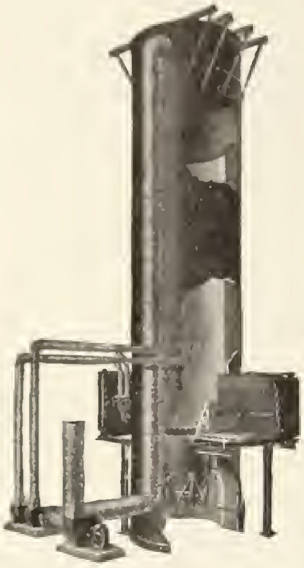
What Does It Cost You to Make Lime?



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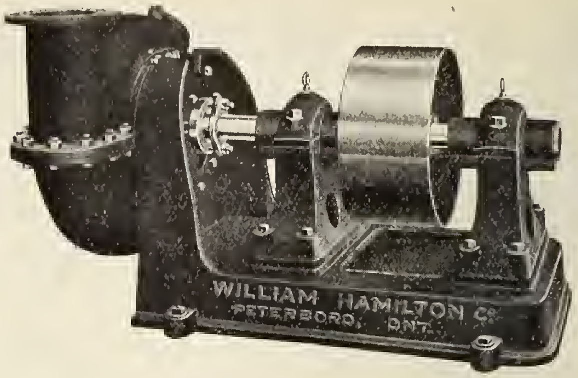

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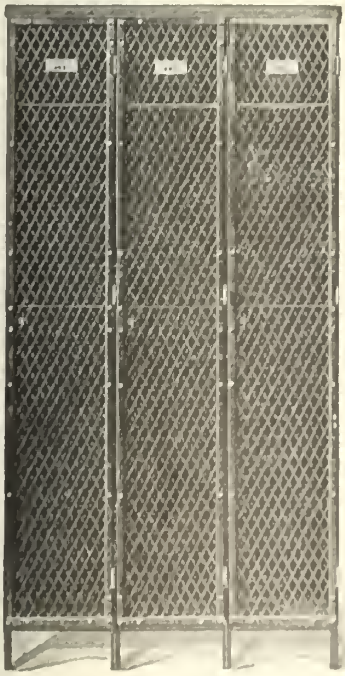

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Vol. 26 November 13, 1912 No. 46

An Important Function of the Technical Press

THE city engineer of Moose Jaw, who contributes a letter published elsewhere in this issue, likens us to certain well known characters in Greek mythology because of our recent articles in defence of municipal engineers. We maintain that Mr. Antonisen's allusion to the task of Sisyphus is not altogether an appropriate one, for the work that we have undertaken differs from that of the ancient Greek in the essential particular that the work we do is duly recorded. Sisyphus labored unceasingly and his work never bore any fruit. The articles which Mr. Antonisen criticises have borne fruit. They have provoked discussion. They have been the means of drawing expressions of opinion from men who have prided themselves upon never writing or saying anything committal.

Our correspondent regards our task as futile because "we do reach the people against whom our arrows are directed," and concludes with the assertion that no good can come from shaking our fists behind closed doors.

Mr. Antonisen overlooks an important aspect of the case. If anything is to be achieved on behalf of a community, is it not the first essential that that community be of one mind in working toward the desired goal? If the discovery be made that a considerable percentage of the municipal engineering profession is working under unsatisfactory conditions, is not the only logical course to interest the remaining percentage? Surely no engineer, however prominent in his profession, could expect to make an abiding impression in favor of his kind by individual and isolated effort. The public press is not the place for the discussion of professional topics, whether technical or otherwise. Nor can the engineer maintain the dignity which attaches to his calling if he traffics with local newspapers and endeavors to work up a case for himself among reporters. It is one of the important functions of the engineering journal to keep well informed of the conditions under which its readers are working, to institute enquiries, to obtain confirmation or otherwise of newspaper statements, to assimilate and to correlate, to foster and encourage discussion, and last, but not least, to undertake editorial comment. In this way, and in this understanding, the engineering paper becomes the mouthpiece of the profession and voices the sentiments of the greater percentage. For the engineer to attempt to stem the tide of public opinion when directed against him by individual publicity work in the press reminds us of that presumptuous undertaking of Canute, who expected the waves to retire at his word.

This is essentially a day of combination. We find combinations effected in every circle where great objects are to be attained—national, social, political and religious. And with the engineering fraternity, also, there must be combination and unity if there is to be strength. The discussion that has been continued for some time in this journal is an examination into the lines along which it would be possible to bring about a combination that would be effective in force against the municipalities. We cannot think that such discussion is futile. Discussion precedes events. The contention that these discussions are lost in so far as city councils and the general public are concerned is erroneous. Reference to our files discloses the fact that within the past year a score of the leading newspapers of the country have reproduced either editorial articles that have appeared in this journal or copious extracts therefrom. Under the conditions now obtaining, such work is the only effective impression that can be made in the interests of the municipal engineer in Canada.

THE Commission Form of Government for cities is a move toward the concentration of authority and responsibility, substituting three men for the customary type of administration consisting of a mayor and council. With this concentration of authority there has naturally been a greater demand on the time of the administrators, since three men must handle the business formerly cared for by many council committees. With such a condition difficulty is sometimes experienced in getting the most desirable type of business or professional men to accept the offices, the politicians and men of second-rate ability being alone eager for the posts. Furthermore, in the case of small towns the financial resources do not permit of salaries commensurate with the ability of the type of men desired. To escape these difficulties the city of Sumter, S.C., which has adopted the commission form of government, proposes to employ a "city manager," who shall have complete administrative control of the municipal government. The arrangement will be analogous to that of corporation management, the commissioners corresponding to the board of directors and the city manager to the general manager of the corporation. By relieving the commissioners of administrative detail it is believed that the ablest citizens can be induced to take the posts. Their salaries will be nominal, thus making it possible to offer a salary to the city manager commensurate with the ability of a competent municipal expert. This step is but another indication that some day, though possibly far removed, governmental service will take a rank in this country similar to that which it holds in Germany to-day, where civil government is a profession. It was in furtherance of this movement that Mrs. E. H. Harriman some time ago established a fund for the training of men for public service. To the engineer the step means still greater opportunity and a broadening of his influence, for engineering training and experience should be invaluable in such a position. That this is appreciated by the authorities of Sumter is evident from their announcement, in which, though not mentioning the legal department, police administration and the schools, they emphasize the necessity for experience in overseeing public works, such as paving, lighting and water supply. If the spread of the commission form of government is any criterion as to the advance of this new phase of the movement, says the Engineering Record, another attractive field ought shortly to open up for competent engineers with administrative as well as technical ability.

LETTERS

"Educate the Press and the Public," says Mr. C. H. Rust

Editor Contract Record:

With reference to the troubles of the municipal engineer that you have been discussing lately and concerning which you ask my opinion, I have been thinking over the matter for the past ten years and I am no nearer a solution of the problem than when I commenced, although I think that matters are steadily getting worse instead of better.

I think one of the remedies would be fairer treatment from the press than is usually accorded. I do not mean to say the press as a body are not fair, but in nearly every city there is some newspaper which seems to make a specialty of criticising civic departments. The engineer being head of the department where most of the taxes are spent naturally comes in for the brunt of it, and unfortunately the members of council are only too eager in a great many cases to follow the lead of the newspapers.

We are not aggressive enough. Very few engineers go into public life. Perhaps it is because we are so busy working and trying to make a living that few of us have the time.

I do not see how the Canadian Society can interfere unless they form themselves into a trades union. But we are much too broad minded to ever think of that.

It has been suggested that the Government should interfere in this matter and control the appointment of engineers to the various municipalities.

After all I do not know that we can do anything but grin and bear it. There is certainly not a very strong inducement for engineers to take up municipal work, which in itself is one of the most interesting branches of the profession and for young engineers one of the best training grounds. I suppose all we can do at present is to try and educate the press and the public to give us fairer treatment.

I noticed in your issue of October 23, 1912, your article entitled "The Engineer as a Public Speaker." I have often thought of this and have observed that as a rule an engineer is a poor speaker. Very often, also, he is deficient in presenting his reports to the council.

Yours truly,
C. H. Rust, City Engineer.

The Editor and the Ancient Greek

Moose Jaw, Nov. 6, 1912

Editor Contract Record:

I have observed with pleasure how you are ever ready to break a lance on behalf of the municipal engineer. But my pleasure is not unalloyed, for I cannot but think that your work is futile. Your task reminds me of that of Sisyphus, the ancient Greek, who was doomed to roll a big stone up a great height, only to find on reaching the top that it always rolled back to the bottom—or there was that task of the daughters of Danæ, who were required to fill a sieve with water. Your task is equally futile because you do not reach the people against whom your arrows are directed. Let me know if I am right in assuming that ninety-nine per cent. of your subscribers are contractors, engineers, architects and supply firms. These men cannot alter existing conditions, for the public is ever ready to regard the contractor as dishonest, the engineer as a bungler and the architect as a necessary evil. If one engineer supports another, the public regards it as an exemplification of the proverbial "honor amongst thieves." If the supply man takes a part the public believes that it is because through the influence of the engineer he is able to dispose of his worthless goods to the trusting municipality. And it is to such people that you are writing your junius letters. You might better be writing essays on perpetual motion and the quadrature of the circle.

What I mean is that our protests do not reach the right people because we use the technical publications instead of the daily press, and it is the latter which molds public opinion. We cannot expect to attain anything by getting together behind closed doors and shaking our fists at our enemies.

Yours very truly,
J. Antonisen, City Engineer.

Interpretation of Specifications

ONE of the most eminent American structural engineers occasionally, if not frequently, made or authorized designs and rulings differing from his own published specifications. This means neither that the specifications were poor or obsolete nor that the engineer was inconsistent, but that the best general specifications cannot and should not be inflexible.

Specifications for ordinary civil engineering construction should be drawn and construed not to impede or embarrass, but to assist the engineer and contractor equally. To this end the first principles involved are to secure the best and most economical work under the given conditions, to define important requirements and to promote justice to all parties to the contract. Above all things specifications should neither be drawn nor interpreted to benefit one party at the expense of the other, or to work any injustice or to secure something for nothing. They should always promote and never impede the prompt payment of a fair price and reasonable profit for satisfactory work.

In many respects specifications should be a guide, not an inviolable law, and should be enforced only by a thoroughly competent engineer, experienced in that class of work and clothed with ample discretionary powers. The general maintenance of a high ethical standard by civil engineers and their well-known devotion to the work in their charge indicates that their authority is as a rule not abused.

Nevertheless men of large experience both as engineers and contractors for important work complain that considerable delay, loss and generally unfortunate results often arise from entrusting the interpretation of specifications to young engineers. It is evident that in many cases inexperienced engineers cannot understand the conditions, previous practice and practical requirements, and are likely to make severe rulings exacting the precise letter of the specifications, which, although technically justified, may be neither necessary nor advantageous. It would be better for these engineers to act more as inspectors, especially in important matters, reporting discrepancies to an experienced chief who has the ability to decide more wisely. This method is, in fact, much used on important works, the inspector's field being limited to a certain class of work and to the enforcement of details only.

New Bank of Montreal Opened at Winnipeg

PERHAPS the largest and most costly structure of its kind in Western Canada was opened recently in the new Bank of Montreal at Winnipeg. This building, a description of which, with plans, was given in our issue of April 6, 1910, was designed by Messrs. McKim, Mead & White, of New York City, and built by Messrs. Norcross Bros., of Worcester, Mass. The building is rectangular in plan. The exterior is built of white granite from the quarries at Bethel, Vt., and its design consists of a Corinthian portico of six columns on the front and a treatment of Corinthian pilasters, with windows between them, at the sides, the whole surmounted by an attic. The interior of the building, a view of which is shown herewith, is in the form of a basilica designed after the style of the colonnaded halls of ancient Greece. The building is of very heavy construction throughout and the entire structure has an atmosphere of massive strength in character with the institution it represents.

Erecting Heavy Girders with a Gin Pole

In a new bridge built to carry 235th street across several railway tracks in the Borough of the Bronx, New York, the roadway is carried by one centre girder weighing 84 tons and two side girders weighing 55 tons, and the footpaths are carried by two outer girders, which weigh 21 tons and 22 tons each.

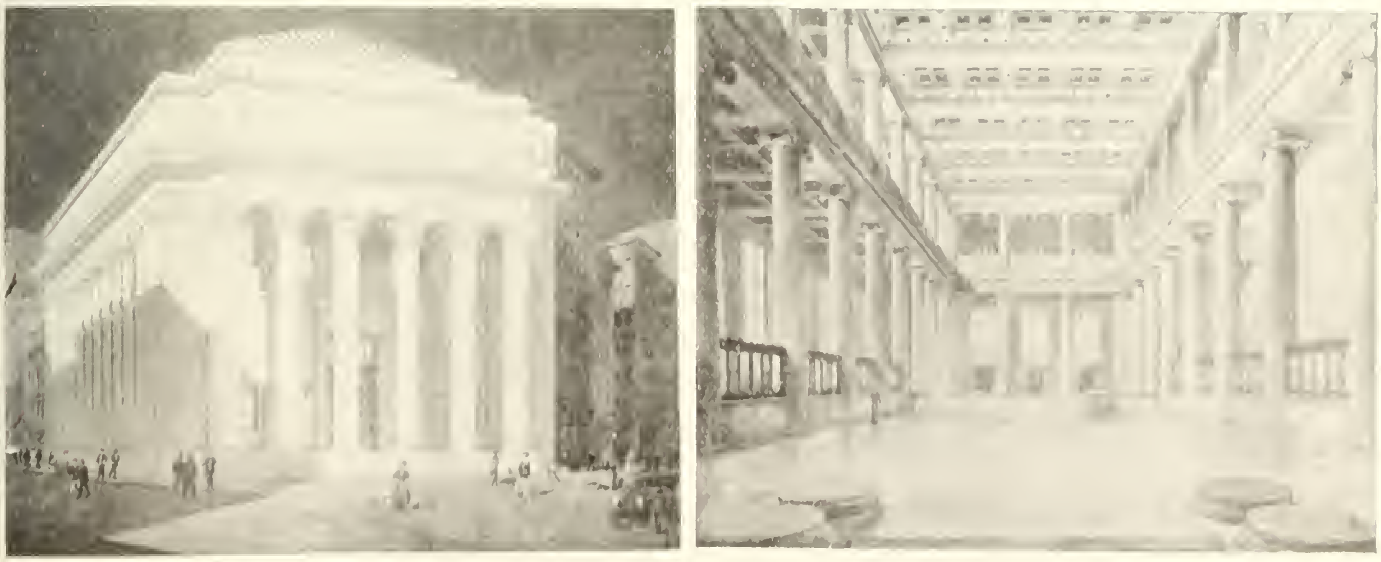
The two outer girders on one side of the bridge were erected by a steel guy derrick of 50 tons capacity, with a boom 50 ft. long. The 84-ton girder was delivered on one of the centre railway tracks to assist the latter in the erection of the girder.

As this method made it necessary to fix the gin pole at a point where it would have interfered with railway traffic, the method was modified so that the girder was erected entirely by the gin pole by which two side girders were also erected.

Having been delivered at a considerable angle with the alignment of the bridge, the girders had to be swung horizontally through an angle of 90 deg., a requirement making the work of hoisting a delicate operation, which, although it had to be performed in short stages, was accomplished in about two minutes.

The gin pole, 65 ft. long, was seated on a special steel shoe measuring 18 in. square at the top and 30 in. square at the bottom. It was built up of four 6-in. equal angle bars at the corners, with latticed bracing, and was fitted with six 1-in. guy ropes and adjustment tackle. The hoisting tackle comprised a ¾-in. steel cable, about 1,400 ft. long, passed through two five-sheave blocks and two single sheaves at the top and bottom, both ends of the line being led to the drums of a 50-h.p. hoisting engine. The hoisting tackle was connected to a shackle lashed to the girder with two 1-in. ropes 125 ft. long, which were protected from the sharp corners of the steel by strips of timber.

A Montreal reader has discovered a number of people whose names are appropriate to their calling, as an instance of which he cites Mr. Derrick an engineer with the Lidgerwood Manufacturing Co., manufacturers of hoisting machinery; Mr. Arthur Surveyer—consulting engineer, Montreal; and Mr. W. Shakeshaft—employed on the tunnel works of the Mexican Light & Power Co., at Nexaca.



Exterior and Interior Views of the new Bank of Montreal, Winnipeg

Architects, Messrs. McKim Mead & White

Contractors, Messrs. Norcross Bros., Worcester, Mass.

Types of Concrete Highway Bridges

Noteworthy Structures, with Details of Design and Cost — Adaptability and Other Advantages of Concrete in this Construction*

YEAR by year the uses of concrete, both plain and reinforced, are meeting with more appreciation, and of all the various purposes and fields to which it can lay claim, none is more legitimate than that of highway bridge construction.

In the early development of any new country, it is necessary that improvements be made with an eye to low first cost rather than to permanence, low cost of maintenance and esthetic and pleasing appearance. For this reason, our earliest bridges were of timber, then found in abundance. As it became necessary to replace the wooden bridge, a material was sought which would be more enduring and more adaptable in use to the engineering problems involved. Stone, wrought iron, steel and concrete in combination have united to meet the requirements, the use of wood in permanent structures being limited now to its use as a flooring material only, and concrete here has taken its place to a very large extent.

Durability of Concrete

The advantages of concrete in highway bridge construction are many, first among which may be placed durability. No other material can compare with concrete when properly used, in durability. Concrete, in fact, increases in strength for a few years after it is placed. It is important, however, that the materials used be first-class and that for outside work all surfaces allow for an easy drainage of water to provide against the danger of freezing. Expansion joints should be filled with asphalt mastic to keep out water and dirt.

Unlike structures in other materials it is not necessary to clean and paint concrete every few years. The cost of upkeep and renewals due to deterioration must be capitalized and placed to the credit of the concrete bridge when its cost is compared with a structure of other materials. Another important economy is due to the fact that with a concrete floor only is it practicable to carry the road metal continuously across the bridge, thus eliminating the unsightliness, noise, expensive repairs and even danger of a wooden floor. There is no economy in a wooden floor which must be renewed every four or five years.

Economy of First Cost

For all ordinary spans a well designed concrete bridge can be built whose first cost will be equal to, if not lower than the first cost of a bridge of any other material designed to do the same work. The difference between the modern bridge and the old style flimsy bridge is evident on the most casual inspection. It should be noted that the first cost of a safe and durable structure is often no more than for the poorer bridge, while the ultimate cost is always less. And no other type of foundation holds and protects the earth banks as does a solid concrete abutment and wing walls, making for additional safety during flood periods.

The distribution of expenditures for a bridge is often of importance to the community. With concrete structures, a large part of the cost is returned to the residents of the locality for sand, stone or gravel, teams and labor; also the lumber and cement will often be purchased through a local dealer, thus keeping a very large portion of the money expended in the community. This is not true of a bridge built of any other material.

The views shown in the following pages illustrate what can be done in the way of adornment with little or no additional expense. The concrete bridge fits in admirably with its surroundings and an appropriate and economical design is easily found for any locality.

Field and Possibilities of Arch Type

Of all types of construction which have been developed in concrete, the arch is the favorite, because in it a free rein is given to a design which will conform to graceful architectural lines and yet carry the loads in an economical manner. If maximum headroom above the water line is not required, the arch may be flattened and the high point of crown of roadway approached from either side by easy grades on a vertical curve. If sufficient waterway cannot be secured without unduly increasing the length of span, or if the foundations are not suitable for an arch bridge, the slab and girder type described later should be adopted. The treatment of the sidewalk or roadway railing is a matter of great importance. If strict economy must be exercised, simple paneled effects may be used or the posts may be of concrete and the rail of iron, plain or ornamental. When more attention can be given to decoration, as for example in parks, cities or private estates, more complicated designs may be involved in the working out of the rail. Many engineers enhance the brightness and contrasts in their structures by the use of white cement in the railing, or by bush hammered and roughened panels. Ornamental concrete or bronze lighting pillars add much to the appearance of the structures. The arch may be designed of plain concrete, but greatest economy is secured in reinforced concrete. When the rise of arch is very great, additional economy can be obtained by skeletonizing the spandrel wall above the arch and carrying the roadway on small arches, or the spandrel wall may be lightened to good effect by paneling on the exterior face.

Girder and Slab Type

The girder and slab type of bridge is primarily a substitution of the concrete girder for the steel girder and of the slab for the steel floor system, all made in one monolithic whole. Although the fundamental outlines are perhaps not as beautiful as in the arch, the parts of the structure may be blended into a much more artistic whole in a way that is impossible with steel girders and masonry piers and abutments. Curved or straight brackets beneath the ends of girders are structurally correct and eliminate the angular effects in the appearance. The slab floor allows for any style of paving and an unbroken surface of roadway, a result now sought after in railroad work as

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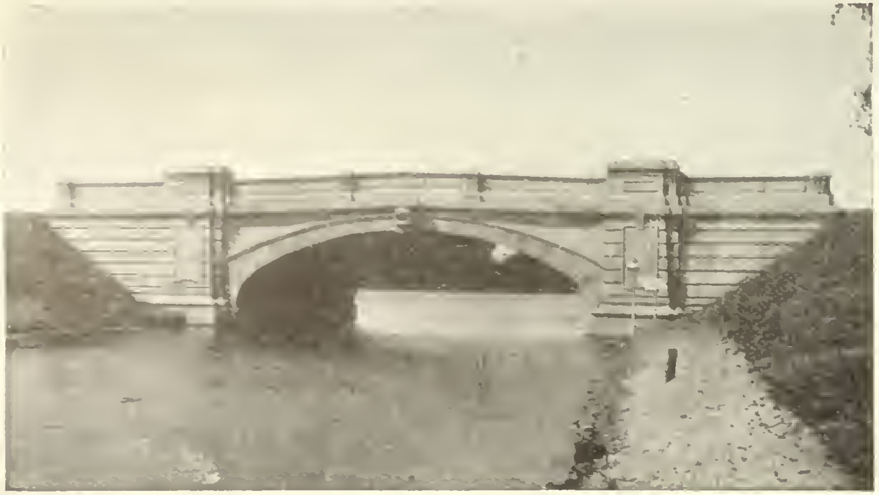
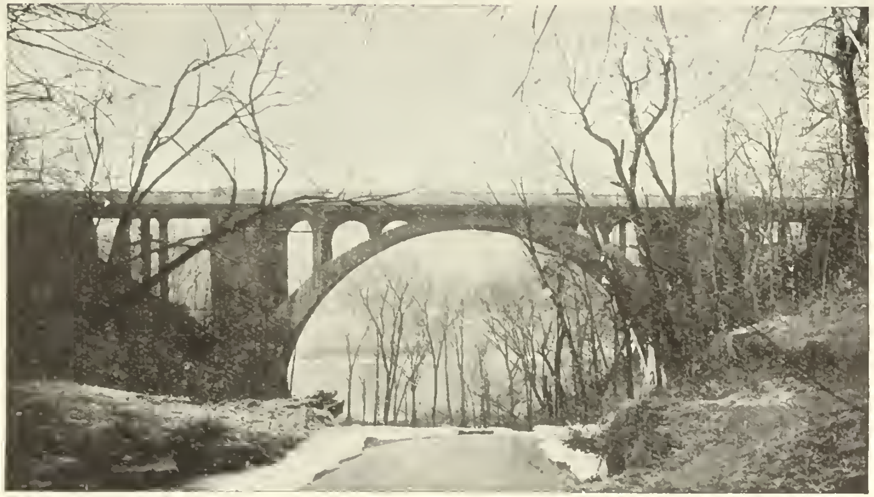
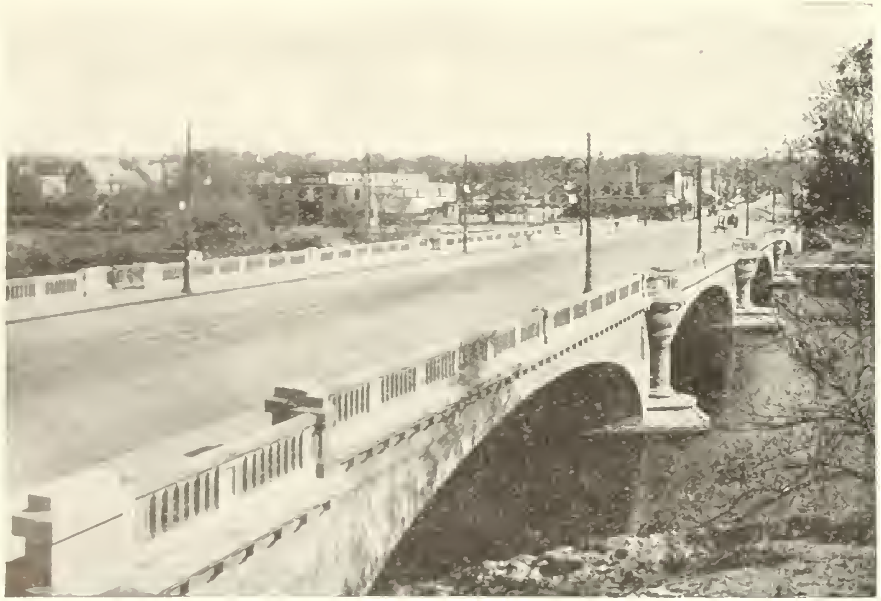
*Abstracted and re-arranged from a booklet, "Concrete Highway Bridges", published by the Universal Portland Cement Company.



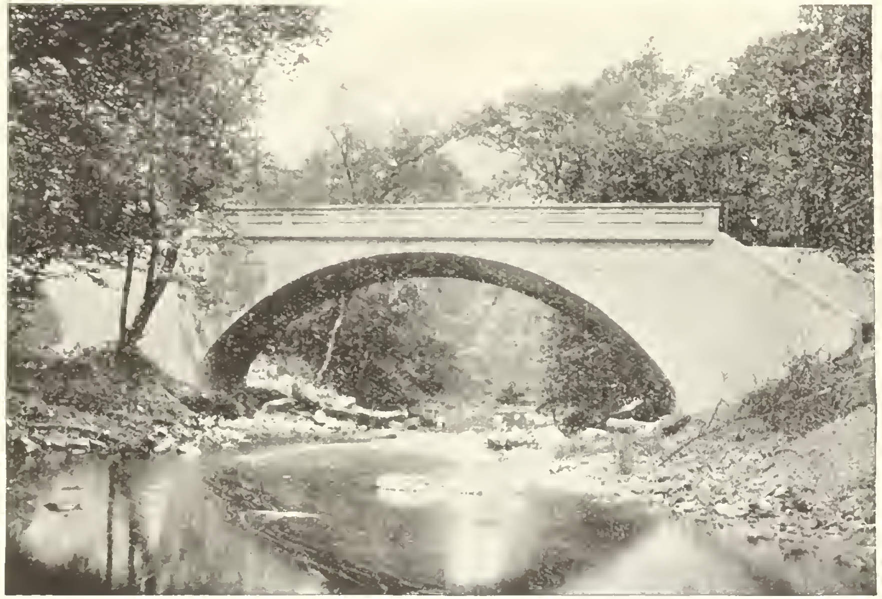
One of the Minneapolis Park System bridges. In this structure the width of arch ring is 53 ft. Accommodation is provided for a 36-ft. roadway and two 8-ft. sidewalks. Finished in Bedford limestone. Cost $35,000.



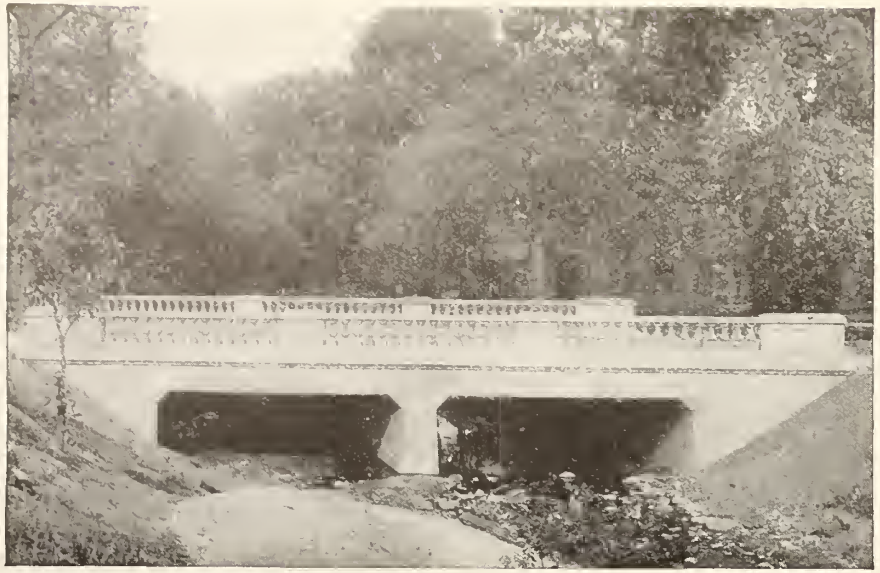
The Mississippi River Boulevard Bridge at St. Paul, designed by Mr. C. A. P. Turner. There are three independent 110-ft. arch rings, each 2½ ft. wide, supporting the roadway through intermediate arches. Total length 227 ft. Clear height above water 98 ft. Cost $20,000.



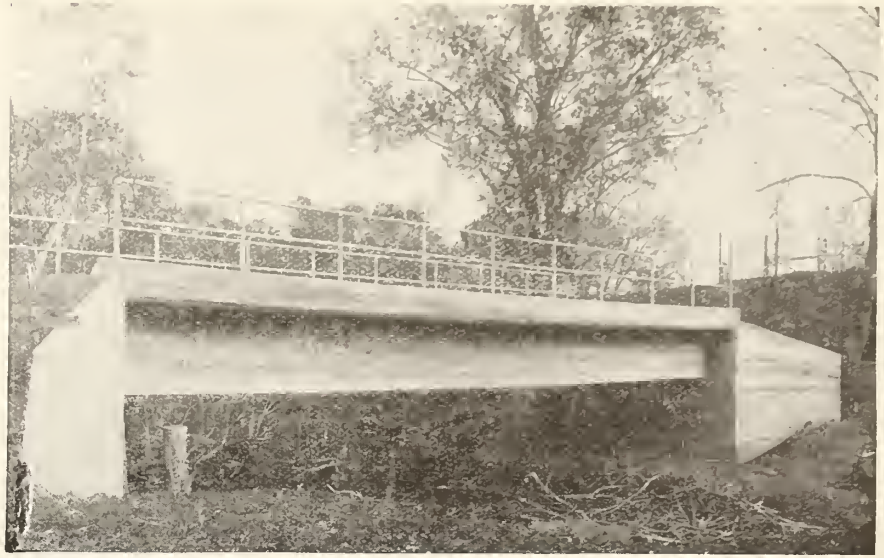
A 4-span structure of the Melan type at South Bend, Ind. The span length is 110 ft. for each arch and the width of arch ring about 74 ft. There are a 52-ft. roadway and two 10-ft. sidewalks. Cost $128,000.



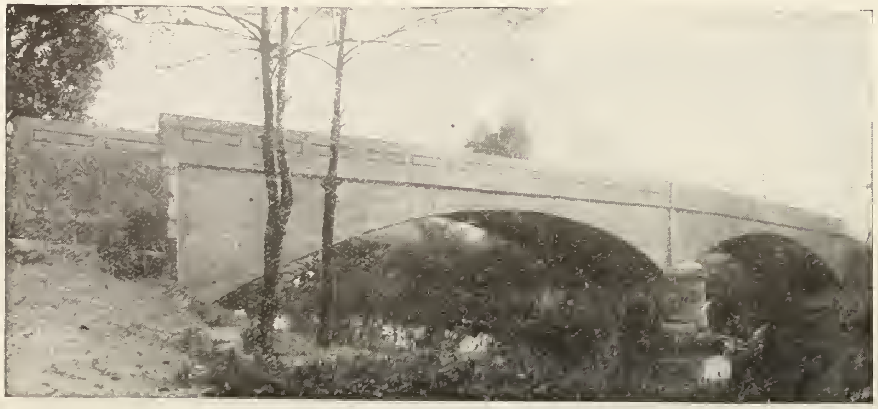
Concrete bridge at Silver Springs, Md. Single arch 55-ft span; arch ring 23 ft. 4 in. wide; clear height above water 20 ft. Designed for live load of two 10-ton road rollers abreast. Cost $6,480.



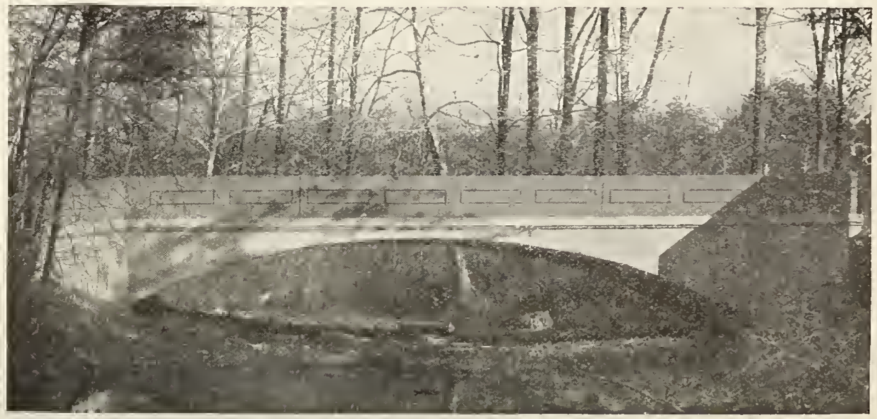
An unusual type of bridge at Indianapolis. Contains two 25-ft. spans, accommodating a 40-ft. roadway and two 5-ft. sidewalks. Clear height 7 ft. above water. Loading used 200 pounds per square foot. Cost $8,000.



Girder type of bridge across Elm Creek, Minn.; 60-ft. span; width of slab 22 ft.; 18-ft. roadway; clear height above water 10 ft. Loading used in design, 18-ton traction engine. Cost $4,680.



Concrete bridge of two 90-ft. spans over the Licking River, near St. Louisville, Ohio. Width of arch 20 ft.; clear height above water, 11 ft. Load used in design, 20-ton road roller. Cost $7,000.



ttractive small span bridge of the Luten design, in Dauphin County, Pennsylvania. Span 45 ft.; width of roadway 16 ft.; clear height above water 6 ft. Load used in design, 20-ton road roller.

well as in highway bridge design. If sidewalks are to be carried it is necessary only to cast the slab with curbs and gutters at the sides of the roadway and to add the proper finish to the sidewalk slab. In this type the concrete girders ordinarily form the side rails of the bridge, whose simple lines, by paneled effects consistent with their massiveness, can be turned to good account.

Strength of Concrete Bridges

The strength of the arch bridge has been long accepted. In order to show the strength of the slab and concrete girder type, the Highway Commission of Illinois not long ago constructed a test bridge of this type with a clear span of forty feet, built exactly as it would be if put across a stream. The bridge was fully loaded with a load of three hundred pounds per square foot, a load much heavier than will be put on a public highway, and next with a concentrated load of forty-four tons at the center of span. "Under this severe load for a highway bridge," says the report, "the total deflection, including the sag in the floor as well as that in the girder, was carefully measured and found to be 0.09 inch, which disappeared as the load was removed." The same load was applied six or eight times with similar results, "demonstrating beyond question the strength and rigidity of these (slab and girder) bridges."

In exceptional cases, when very long spans can not be subdivided and a series of arches, girder spans or trestle work used, a combination of steel and concrete is convenient, the trusses, floor beams and stringers being built up of structural shapes, the solid floor being secured by the use of a reinforced concrete slab resting on and usually encasing the stringers. In this case, of course, whatever beauty is attained must be in the lines of the truss.

Special Features of Design and Construction

There are a few things to be observed in the design and construction of concrete highway bridges which apply particularly to this branch of concrete construction. In arches the concrete should be laid in continuous rings or in large voussoirs so that the various units represented by each day's work will be in stable equilibrium even though there should be any imperfection in the bond between any of the units, although especial care should be exercised in securing a bond between the fresh and set concrete. Similarly, in the slab and girder construction, the location of the dividing lines between the day's work is a matter of importance. Temperature stresses should be carefully considered and taken care of by proper reinforcement or in other ways. The form work and centering should be of a sufficient strength so there will be no bulging in the lines of the structure and so that no weakness shall be developed by even partial failure of the forms while concrete is setting.

Standard Practice in Reinforced Concrete Highway Bridges and Culverts in Iowa

THE first concrete bridge or culvert in Iowa of which there is record, was a bridge of the Milan type built near Rock Rapids in 1893. About ten years later the engineers of the Iowa State Highway Commission, led by the increased interest in the possibilities of concrete highway structures, began to prepare and distribute plans for concrete bridges, culverts, etc. This work has continued and now various types of standard structures have been somewhat closely adopted. These types are described by Mr. T. H. Macdonald and Mr. C. B. McCullough of the Highway Commission in a recent paper before the Iowa Association of Cement Users. The types described include box culverts, slab and beam bridges and retaining walls. An abstract of the paper follows:

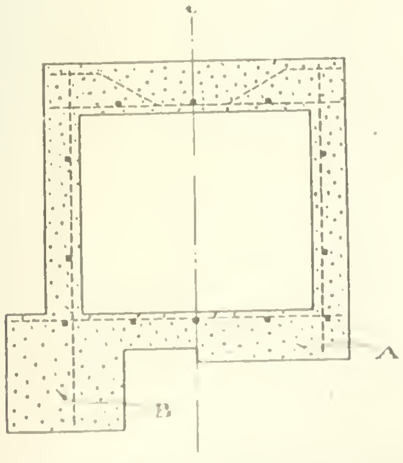


Fig. 1 Reinforced concrete box culvert.

The various types of concrete bridges adapt themselves to the following classifications: (1) Circular and box culverts; (2) slab bridges, and (3) girder bridges and arches. The girder bridges may be subdivided into deck and through girders. There is also another class, the steel truss with concrete floor.

Taking these types up in the order named, Fig. 1 is a box culvert showing a cross section through the barrel of the culvert. The top, sides, and floor of this culvert, act as beams under the vertical loads, the horizontal earth pressure, and the upward foundation pressure, respectively. Since in each case, the load acts from the outside inward, the reinforcing is placed in each case on the inside of the wall or slab.

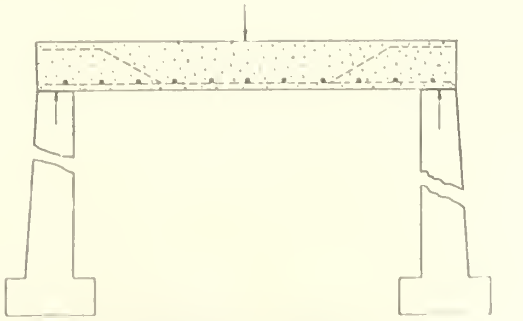


Fig. 2 Reinforced concrete stub bridge.

Since there are no expansion joints, no cantilever action can take place and there is no need for reinforcing on the outside of the walls. The top slab is reinforced with bent up bars as shown to provide for the diagonal tension as outlined above. Two types of footings are used in these culverts. The one marked A, known as a float footing, consists of a heavy floor extending clear across the slab and depending for its stability on the wide distribution of the load. In the type marked B, the footings directly underneath the walls are carried down to a considerable depth and are connected by a thin floor slab built just strong enough to take the bending due to frost action.

The second type as the name implies, consists of a slab or beam of concrete (Fig. 2) as wide as is required for the roadway, resting on two abutments. The reinforcing is for simple bending and diagonal tension. Since at each bridge seat there is an expansion joint, the abutments (Fig. 3) are reinforced near both back and front surface with rods running vertically and horizontally. The horizontal rods form a frame work for the reinforcing, bond the wings to the abutment proper and prevent cracking due to temperature changes in the concrete. The rods in the back face take all the ordinary stress. The front reinforcement is called into action only in case of the failure of the expansion joint to act properly, on this account the vertical reinforcing system in the back is much heavier. Steel bars placed both longitudinally and transversely in the footing as shown, help to distribute the footing load and to anchor the main reinforcing members.

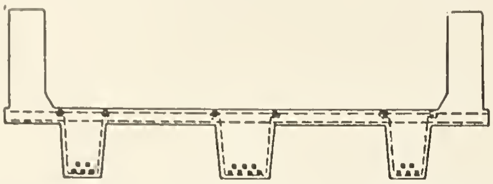


Fig. 3—Reinforced concrete deck girder bridge.

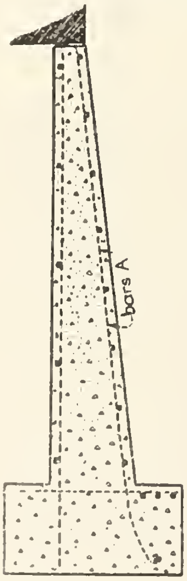


Fig. 4—Reinforced concrete retaining wall.

Figure 4 is a cross section of a deck girder bridge. The girders are nearly rectangular in section having a slight draw towards the bottom to admit of easy removal of the forms. These girders are thoroughly bonded by means of stirrup rods to the floor slab which rests on top of them, the latter acting both as the floor and as the top flange for the girders. The load is carried by the floor to the girders and by the girders directly to the abutments. The rectangular sections at the side of the roadway serve simply as hand rails and do not help to transmit the load.

Due to the diagonal tension, there is always a tendency for the bent up reinforcing members to fail by a pulling out or breaking of the bond near the end. For this reason a positive connection or fastening of the main reinforcing members at the end of the girder is very desirable. A system of this kind employed with success by the Commission during the last year is substantially as follows: The reinforcing bars are bent in the shops and fitted with a hook on the end. An end plate is also made in the shops and fitted with notches or slits from both top and bottom of sufficient width to admit the reinforcing bars. These notches are so spaced that when the reinforcing bars are dropped in they occupy the position as computed in the structure. After the bars are dropped in these notches, two small plates about 3/8 in. thick are bolted one to each side of the plate both top and bottom, thus completely enclosing and rigidly fastening the reinforcing members.

The other type of a girder, the through, Fig. 5, differs from the type just described, in that the girders, two in number, are placed above and at the side of the roadway. The reinforcing in these girders differs very little in principle from that employed on deck girders. The girders now occupy the space occupied by the hand rail in the deck type and the floor system is hung between the two girders and reinforced transversely in much the same manner as an ordinary slab.

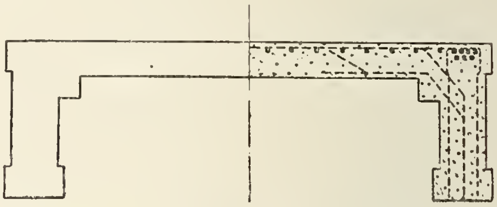


Fig. 5—Reinforced concrete through girder bridge.

Type of Bridge Used for Different Classes of Waterways

There is a distinct difference in the shape and size of the drainage lines in Iowa, those lying within each distinct glacial area being peculiar to that area and the types of waterways built should be selected with reference to the topography. For illustration: in the broad, flat, monotonous stretches of the Wisconsin glacial region which lies in the north central part of the state, the drainage areas are for the most part, flat and not well defined. The channels quickly fill to overflowing and a large percentage of the waterway must be obtained by raising the road grade above the land level. For such openings, the slab and through girder bridges offer the greatest amount of waterway with the least rise and span. In the construction of bridges in this area, the possibility of the ditch being incorporated in a drainage district must always be guarded against in planning a bridge. An instance is brought to mind of a practically new concrete bridge in Buena Vista county that is to be destroyed because the foundations were not carried sufficiently deep when constructed to provide against the deepening of the channel as part of a drainage district.

In the more rolling areas along the rivers on the east and west boundaries of the state, many of the streams have deep, sharply defined channels. During times of heavy storms the water rushes through the openings in mad little torrents that quickly scour under the foundations unless they are protected by deep footings and floors. For these deeper ravines, the box culvert with ample floors and footings, the slab or deck girder or arch bridge with high rise are all applicable. In the Kansan drift area which covers a large portion of the southern part of the state, the deep cut drainage channels generally exist and these types are all applicable to this section.

For spans up to about sixteen feet it probably makes very little difference in the amount of material either of steel or concrete, required to build a culvert of either of the above types provided the depth of foundation and area of waterway is the same. For spans sixteen feet above, the character of the foundation will have much to do with the determination of the economical structure. Yellow or blue clay is about the best foundation (unless piling is used) that can be found in a majority of the counties of the state and one of these can be reached at a depth of three or four feet below the stream bed. On such foundations, the form of construction such as the slab or girder bridge, or for the longer spans, steel bridges with concrete floors, seems to be desirable as the expansion joint at each abutment will take care of the expansion and contraction of the structure as well as any settlement of the foundation without causing material cracks.

The Advantages of Sand-Boxes

FORMERLY sand-boxes were rarely, if ever, used for any other purpose than the striking of centers for masonry arches, says the Engineering Record. Within the last few years their usefulness has been extended to the lowering of steel bridge spans through a vertical distance large in comparison with that required for striking the centers under masonry.

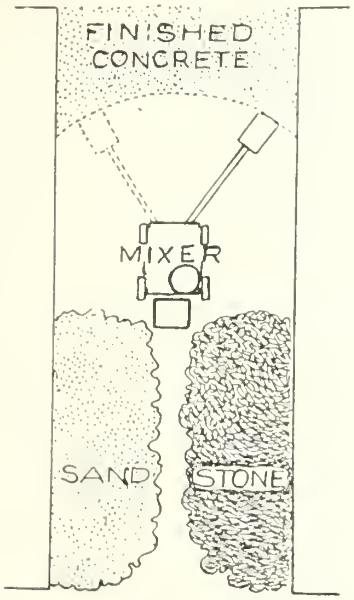
Sand-boxes properly applied afford a very simple, reliable, rapid and economical method of lowering almost any structure which can be satisfactorily supported on them, thus taking the place of costly hydraulic jacks which are liable to serious derangement, require frequent shifting and must always be followed up by blocking. An advantageous feature is the fact that very heavy vertical loads on sand-boxes do not produce the enormous horizontal pressures developed in corresponding hydrostatic appliances and that sand-boxes do not require excessive strength for very heavy loads. They can easily be designed for a long vertical stroke and their operation can be controlled positively and accurately.

An interesting application of sand-boxes to a difficult bridge movement is described in this issue, where the use of hydraulic jacks for a very few moments transferred the weight of the structure to simple sand boxes. They carried the structure and its tracks for several days with perfect stability, and then lowered it in complete safety, and transferred the weight entirely to different supports rapidly, easily and at short notice, thus very much facilitating other important operations.

Unfortunately the virtues of the sand-box do not include ability to develop mechanical force for raising as well as lowering heavy structures, but there is undoubted opportunity for structural engineers and contractors especially to apply sand boxes very advantageously to receive and transfer heavy loads and handle them where it is not necessary to raise them or where auxiliary lifting can be accomplished by other methods.

Laying Concrete in Street Work

This drawing shows a logical method for the laying of concrete in street work. The piles of materials are first delivered along the sides of the street, the sand on one side and stone on the other. A mixer having a rear loader is used, and delivering from a boom which covers the width of the street. The machine then moves gradually down the street, taking in raw materials at one end and discharging concrete at the other.—The Contractor.



Method of laying concrete in street work

Modern Construction in Old Building

The razing of an old four-storey bank building in Providence, R. I., erected in 1823, shows that the skeleton frame principle, as employed in our steel sky scrapers, is not such a new thing as we have thought, says a contemporary.

Steel construction was unknown in 1823, but John Holden Green, who erected this building, used wooden timbers instead of steel, in exactly the way steel is now used. He erected the building's skeleton of great logs of spruce, adding the brick front with its granite facing, and tying the latter to the frame with great bolts at each floor.

Few men fail to rebel at times at the irksomeness of the tasks they have to do, and the necessity laid upon them to do just about so much every day before they can go to bed, says an exchange. And yet every man who tries it knows that if he lets up a little, his capacity for work seems to diminish, and, with the capacity, some of his ability for doing good work. It is a commonplace that the men who are busiest can always do a little more. And the more they do, in most cases, the better the average quality of their work seems to be. The new task which is taken on serves as a mental stimulus which affects all the other things the man is doing. Men, therefore, have reason to be thankful for the grind, and to be distrustful of the voice which bids them take things easy. For the grind is a man's friend, to bring out of him a steady flow of the best things that are in his heart and brain.

New Legislative Buildings of Alberta

Imposing Structure, Designed on Classical Lines, Now Nearing Completion at Edmonton—Elaborate Arrangement and Equipment

THE new Parliament Building at Edmonton, Alta., now nearing completion, is built in the form of a "T," having the main facade parallel to and 200 ft. south of Saskatchewan avenue, and the main entrance directly opposite the centre line of Eight street. The building is designed on strictly classical lines, following the Corinthian order.

Dimensions

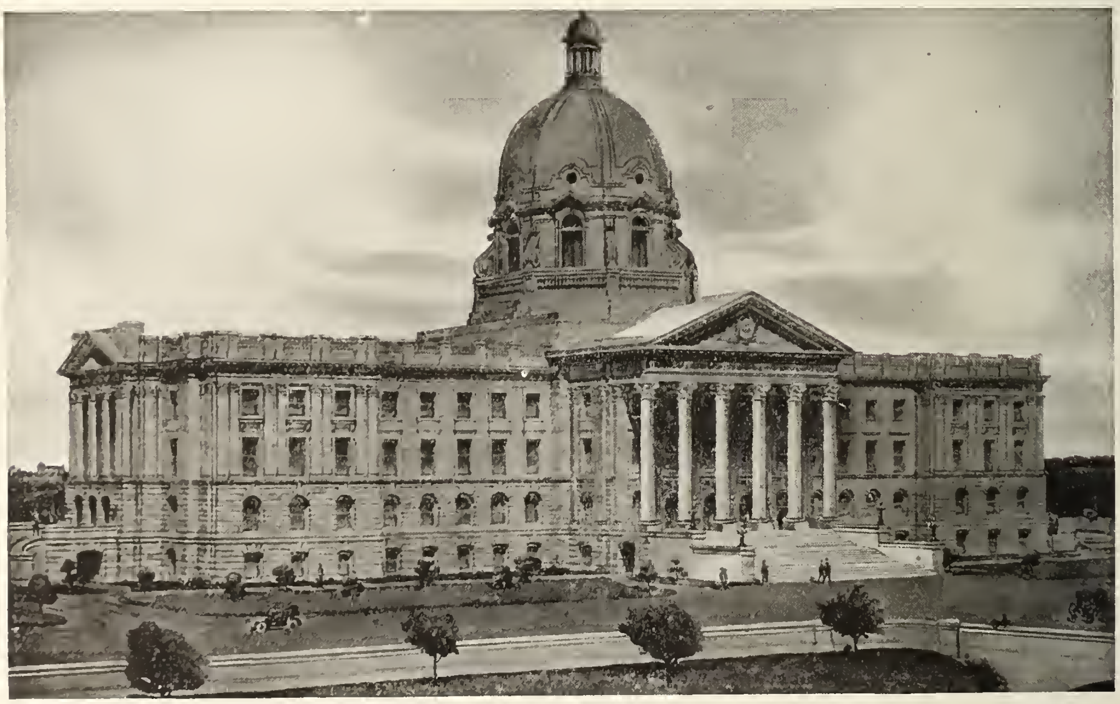
The main entrance, or centre pavilion, is 83 feet wide, flanked on the east and west sides with administrative wings. Each wing is 130 ft. long, exclusive of entrance steps, which extend away from the ends a distance of 42 feet each.

The main entrance pavilion, including entrance steps, extends north from the main facade, a distance of 75 ft. from which point the building measures on its north and south axis 290 ft. The building is 58 ft. high from the ground line to the top of the main cornice and from the entrance line to the base of lantern on the dome is 88 feet. In general the building occupies a plot of ground 427 feet by 290 feet and from the ground to top of dome is 178 feet.

Construction

The building is of strictly fireproof construction, having broad concrete footings and foundation walls up to the ground line. Above ground the exterior walls are faced with stone masonry, backed with brickwork and furred on the inside faces, with hollow porous terra cotta blocks for the purpose of providing air space to prevent dampness and to make a solid background for plastering work. The interior is of steel construction, consisting of steel columns supported on concrete footings and steel floor beams and roof trusses. All of this steel work will be fireproof, using concrete bricks or terra cotta as best suited for the work. The steel work is a unit in itself, and is not dependent upon interior partitions for support.

The walls of the rotunda and vaults are built of first-class brick masonry. All the other interior walls are built of hollow porous terra cotta blocks and are so designed that at any time any partition or set of partitions or any floor may be removed without interfering with the construction of the building, with a minimum interference with the business operation of any department. The floors will be reinforced concrete construction or protected steel beams, having marble and tile floor finishes.



A reproduction of the original perspective of the Alberta Legislative Buildings at Edmonton

The building in its general appearance is substantially built of brick masonry structure, free from ostentatious carvings; and yet with its massive entrance columns and pavilions of the administration and legislative wings, breaking the plain wall surface, and the low dome which surmounts the whole, it leaves the impression that a conscientious effort has been made to produce at once a simple pleasing structure and one that is in keeping with a large monumental public building of this character.

At first glance one would think that there were but four storeys to this building, but in reality there is a sub-basement, and an attic storey in addition to those first seen at the front or north elevation.

The general offices of the administrative wings will be plainly finished in plaster, and in keeping with

An early stage of erection

dignified business methods. The main entrance rotunda, dome, and all public and private rooms in the legislative wing will be finished in marble and decorative plaster and decorative oil or water color paintings.

Use of Building

All floors of the wing buildings will in general be used for departmental business and will be wholly apart in their uses from those of the legislative wing, which will be mainly at the disposal of the legislative body. The museum in the basement, and the library and cafe on the first floor will be placed in the legislative wing.

Administration Wings

The administrative wings have their ends facing east on 7th street and west towards 9th street. They will be approached by neatly laid out paths and carriage drives. Two entrances are provided at each end of the wing buildings, one for the basement entrance at the ground level, and the other up a flight of stone steps which are forty-five feet wide at the start and gradually close to a width of thirty feet. After passing through the arcade entrance and vestibule of the wing buildings, one enters a central corridor flanked on one side with service elevators, and on the other with service stairs, both of which are enclosed in separate fireproof walls continuous for the full height of the building. Continuing along the corridor, one passes the general offices of the Departments, coming finally to the corridor surrounding the rotunda.

Constructional view, showing the heavy steel work

Approach to the building is made over a masonry viaduct, spanning Saskatchewan avenue. There are two entrances, one of which is a basement entrance under and the other above the masonry steps. The steps are flanked on either side with massive buttresses, which have a clear opening of 60 ft. between them, ornamented with moulded cap stones, and surmounted with four bronze lamps. At the top of the main entrance steps there are six corinthian columns, each column being four feet in diameter, and forty feet in height. The main entrance consists of three circular top masonry openings, in which are placed ornamental bronze doors. A spacious vestibule leads to the corridor surrounding the rotunda.

Rotunda

The corridor surrounding the rotunda is from 10 to 12 ft. wide. In the two angles nearest the main entrance there are nitches for statuary. The other two angles will contain public elevators, which run from the basement to the attic floor. The corridor will have plaster walls and beamed ceilings in decorative plaster and marble. The rotunda is 46 ft. square with a circular well at the centre for the purpose of lighting the basement storey, having octagonal corners, and extending upwards from the first storey to the third storey, with a gradual springing out made from the octagon with circular pendatives until a complete circle is arrived at. This circle is carried up with circular top windows and ornamental pilasters and cornices to the elliptical beamed and panelled ceilings of the dome.

From a recent photo showing the building practically completed

There are openings all round the rotunda, at every floor level, having square or circular tops as best suited to the design. These openings are finished with ornamental marble columns and balustrades. The pendatives which spring from the octagon corners are panelled and the friezes immediately over will have an oil or water color painting of a suitable design representing historical or typical scenes. The general finish of the rotunda and its corridor will be in marble and ornamental and decorative plaster work.

Grand Staircase Hall

The sides of the grand staircase hall have ornamental columns finished with a moulded cornice and above the cornice springs a barrel vaulted ceiling, which is beamed and panelled and has an ornamental glass skylight. The two long sides and one end of the ceiling will have lunettes which will be decorated with pictorial paintings. Around the grand staircase hall will be corridors finished on open sides with ornamental balustrades and pedestals for statuary and on wall sides with decorative panels. The general finish of the grand staircase will be in keeping with that of the rotunda.

Legislative Chamber

The legislative chamber is fifty-six feet square and extends in height through the second and third storeys. In its design it follows the dignified lines of the Ionic order, there being two detached columns on each of the four sides and angle pilasters at the corners. These columns are brought together with a moulded cornice continuous around the four sides of the chamber. Above the cornice there is a large barrel vault having panelled beams and ceilings and ornamental glass skylight. In the north and south ends there are large elliptical lunettes which will have historical pictures painted on them.

The sides of the chamber will have solid partitions separating the Speaker's Room, Members' Room and General Retiring Rooms from the chamber. The Speaker's and Members' rooms will have fireplaces and all toilet accessories and conveniences.

Over the rooms surrounding the legislative chamber on the third floor are the various galleries given over to the use of the public, members' friends and the press. The rotunda will have two public elevators. Besides the grand staircase in the legislative wing, there are service stairs to the basement, private stairs for the members of Parliament, and stairs to the gallery for the public, one vault and private lavatories.

The building will be heated and ventilated by a modern system of steam, hot water and warm air, that has proven successful in other buildings of this character. All parts of the building will be cleaned by pneumatic or vacuum process.

The heating, ventilating and pneumatic plants will be installed in the sub-basement storey, but the main steam and electric plant will be in a separate power station, situated several hundred feet away from the building to avoid smoke and gas nuisance. Access from the power station to the building will be by tunnel connected with the sub-basement of the building. This tunnel will also be used for transmission purposes for main steam and vacuum pipes and electric wires.

The building was designed by Mr. A. M. Jeffers, the former Provincial Architect for Alberta.

Plastering Walls by Spray

A recent German patent is for plastering walls by spraying.

The principal characteristic feature in the invention is that the mortar or plaster is brought under pressure to the place where it is applied, and then sprayed by compressed air upon the surface to be covered.

The process is adaptable for making partitions where woven wire is stretched on frames; also for covering walls where "wire lathing" and the like is employed. The mortar or plaster, brought to the proper consistency with water, is pumped through a pipe or hose ending in a nozzle, through the centre of which there is a pipe for compressed air. The wall, thus bespattered with plaster, must necessarily be slicked off.

Where partitions or thin outer walls are made by plastering on woven wire, this is backed during the spraying by a suitable board or other surface, which is removed as soon as the layer on the front side is sufficiently thick and firm. Then, when requisite, the outer side may be similarly treated. The patent also covers the use of compressed carbonic acid gas instead of air, the object being to hasten the setting of the mortar or plaster.

Influence of Moisture on the Expansion and Contraction of Concrete

THE formation of cracks has an important bearing on the life of concrete pavements, and in order to reach an understanding of all of the factors involved in cracking, or, in other words, in the expansion and contraction of concrete, the office of Public Roads undertook a series of tests which early this year had progressed far enough to indicate the influence of moisture on expansion and contraction. A paper on these tests was read by Mr. Logan Waller Page, director of the Office of Public Roads, before the Ohio State Engineering Society, and has been reprinted in the society's proceedings, from which the following abstract has been prepared.

Numerous cracks appear in many concrete structures soon after their completion and the reason in most cases is not the failure of the concrete to resist the external loads imposed, but is due to the inherent contractive qualities of the concrete mass. The shrinkage due to a fall in temperature has been very carefully measured by a number of investigators, who quite generally agree that 0.0000055 in. per inch of length per degree Fahrenheit is the correct value of the contraction. The temperature changes are due not only to the variation of external temperature, but also to the chemical activity of the cement during the hardening process.

The fall in temperature of a mass of concrete caused by atmospheric change has long been recognized as being of sufficient magnitude to cause cracking. It has also been demonstrated notably by the Boonton Dam Experiments, that very high temperature may be developed in large masses of concrete during the hardening process. In time, as the heat is dissipated by conduction and radiation, the temperature is bound to fall, with the production of enough tensile stress to cause cracking. Another source of contraction, that due to drying out the water from the concrete mass, is likewise known to exist, but the information is qualitative rather than quantitative.

Method of Making the Tests

The tests were conducted on columns 8 in. square and 5 ft. long, and the concrete was mixed in the proportion of 1:2:4 and 1:3:6. The materials used were Portland cement passing the specifications of the American Society for Testing Materials, well graded, clean river sand, and crushed gneiss. Two consistencies were used—very wet and very dry. The very wet concrete was simply puddled into place, while that of very dry consistency was tamped into the mold with difficulty.

One-half-inch bars, square in cross-section, were molded in the specimens 50 in. apart. Upon removing the wooden forms these bars projected 1½ in. on each side of the specimens. Steel plugs with rounded conical points were attached to the square bars, and measurements were taken between the points by means of a micrometer fitted to a specially designed frame. With this apparatus, readings could be taken accurately to a few ten thousandths of an inch.

As soon as the concrete had hardened sufficiently, the molds were removed and the initial readings taken. The temperature of the specimens and that of the air were noted at each reading of the micrometer, and all readings were corrected to constant temperature. In this way the influence of temperature changes either in the atmosphere or in the concrete were eliminated and the deformations obtained therefor represent the change in length of the concrete due to the effect of moisture alone.

Results of Measurements

The results obtained agreed with those of previous investigators in showing that concrete expands when it is allowed to harden under water and contracts when allowed to harden in air. Those specimens which hardened in air showed contraction almost from the beginning of the test. A very slight expansion, too small to be plotted, took place during the first day or two. The tests indicate that the 1:2:4 mixture contracts more than the 1:3:6 mixture; likewise that the greater portion of the contraction takes place within the first three months and fully fifty per cent. of it within the first month.

The amount of the maximum contraction at six months is 0.00068 in. per inch of length in 1:2:4 concrete, a figure which goes far toward accounting for the rupturing of many concrete constructions, even when temperature changes are negligible. If it is assumed that the ends of a concrete construction are rigidly held and the concrete is allowed to harden in air, the tendency toward shrinkage would immediately create a tensile stress in the concrete mass, and its amount at the end of six months would, if this were possible, be equal to 2,000,000 multiplied by 0.00068 or 1,360 lb. per square inch, if the modulus of elasticity is assumed to equal 2,000,000 lb. per square inch in tension. Concrete is capable of withstanding only from 100 to 200 lb. per square inch in tension, so that even when there is absolutely no temperature change, it is impossible for a plain concrete construction to remain intact when enough resistance is offered to its free contraction due to drying. The decrease in length of a mass of concrete 100 ft. long due to the drying out of the moisture would be about 0.81, or roughly $\frac{3}{4}$ in. To cause the same amount of contraction, a fall in temperature of 124 deg. Fahr. would be necessary, but this is a range in temperature which few concrete constructions receive. It would seem, from the above figures, that the temperature changes in some concrete constructions play but a secondary role in the production of cracks.

A test was likewise conducted on a specimen of 1:2:1 concrete reinforced with $\frac{1}{2}$-in. round rods placed 1 in. apart and extending the entire length of the test-piece. The contraction of the concrete in this case amounted to 0.0003 in. per inch of length, as compared with about 0.00068 in. in the corresponding unreinforced specimen. The steel in this specimen is undoubtedly receiving high compression from the results of the shrinkage of the concrete.

Concrete Hardening Under Water

In obtaining the change in length of concrete under water, the specimens were first allowed to harden for two days in air, then measurements were taken with the micrometer. After measurement, they were immersed in water in a horizontal position and, in order to permit their free expansion, they were laid on rollers. The results of the measurements showed that in every mixture of concrete tested, a decided expansion took place. At the end of three months, the specimens were still expanded and exhibited at that period a change of approximately 0.0001 in. per inch of length—a value from one-fourth to one-sixth of the contraction of the same kind of concrete when stored in air. After about one month, the length of the specimen remains practically constant, as nearly as can be judged from the results of the micrometer measurements.

When the ends of a concrete construction are fixed, the tendency toward expansion will be resisted with a resulting compressive stress at the end of three months of 2,000,000 multiplied by 0.000075 or 150 lb. per square inch.

It thus becomes plainly evident that when concrete, which is continually wet, is prevented from free expansion, it may receive high initial compression from this cause. It is likewise evident that the steel in reinforced concrete beams may be subjected to high initial tension from the effects of this expansive tendency.

The combination of water with cement, with the resulting formation of colloids or gelatinous bodies having greater volume than that of the cement in its untreated condition, may account for some of the expansion. When the water is allowed to dry out from the concrete mass, the colloids shrink in volume owing to the loss of water, and the concrete mass therefore shrinks. It is not at all improbable that the expansion and contraction of the rock aggregate due to the change in moisture content is also of influence in causing a change in the length of the concrete mass of which it is a component.

Practical Phenomena of Expansion and Contraction

These tests serve to explain the cause of many defects in concrete construction, and may suggest means for rectifying them. The fact that a concrete wall 100 ft. long might shrink $\frac{3}{4}$ in. in length due to drying, very clearly explains the presence of cracks in many such structures. In the case of a concrete roadway provided with expansion joints every 50 ft., each section is liable to shrink $\frac{3}{8}$ in. due to the drying out of the moisture from the concrete, and this is again sufficient reason for cracking, considering the frictional resistance offered to free movement between the concrete and the foundation.

Many sidewalks divided into blocks and made with a top wearing coat of rich mortar laid on a concrete base, become dished in appearance in a short time. This phenomenon is readily explained by the fact that the rich mortar top coat contracts a great deal more than the concrete base, which may even be expanded owing to the retained moisture absorbed from a poorly drained foundation. The fact that the surface coat has a higher coefficiency of expansion and contraction owing to wetting and drying than the concrete is sure to produce a shearing stress between the two coats which tends to separate them, with the resulting destruction of the surface. Disintegration of this character is often noticed in pavements in which the bond between the wearing coat and concrete is weak because the wearing surface has been laid after the concrete base has hardened.

It has been noted that structures of concrete made to contain water, leak when allowed to dry out, but, when again filled, become watertight. The leakage in a great many instances may be ascribed to the formation of cracks due to shrinkage rather than to the porous condition of the concrete itself. When the concrete again becomes wet, it expands in length, the fine cracks are closed and the leakage is stopped.

The New Manitoba Agricultural College

The Largest Current Building Work of the Prairie Provinces—Estimated Cost Five Millions—Features of Design and Construction

ONE of the finest institutions of its kind and probably the largest on the American continent will be the new provincial agricultural college at St. Vital. Incidentally the work of construction is the largest building project now being carried out on the prairies.

The new Manitoba Agricultural College is situated at St. Vital, a suburb of Winnipeg. The site is six miles distant from the city and is reached by the Pembina Highway, upon which a twenty-foot pavement is being laid the whole distance to the college. A car line will be built later. The road runs in a straight line past the wide bends of the Red River. The site of the college is upon one of the promontories formed by one of the wide sweeps so numerous in the course of the Red River. Thus the institution will be so situated that there will be water upon three sides.

A $5,000,000 Project

The total area of the site is 1,100 acres. Of this area about 30 acres will be occupied by the buildings, which are placed in a group somewhat semicircular in nature, the administration building occupying the central position, the dormitory building standing a few hundred yards to the west and beyond that the power house. At the opposite side of the semicircle are the two other buildings now under construction, one of which is to be devoted to horticulture and biology, and the other to chemistry and physics. Plans for a number of other buildings have been prepared, including those for the following purposes: Engineering, machinery hall, implement house, dairy, judging pavilion, horse barn, beef cattle barn, dairy cattle barn, sheep barn, piggeries, poultry houses. Contracts for these buildings or a number of them will probably be let during 1913. The contracts let for the buildings now under construction amount to approximately $2,500,000. The total cost of the whole project will be in the vicinity of $5,000,000.

The Administration Building

The administration building is the most impressive of the group in an architectural sense. It follows the Grecian style of architecture and is double fronted. The front and back are uniform in construction and finish, and massive entrances face in both directions, one to the north and one to the south. These entrances are decorated with four ponderous Corinthian columns, each 3 feet in diameter at the largest part. Each abacus is finely carved, the lintels are heavy and symmetrical, and the frontal completes a most effective feature to a fine structure. The central tower of the building is in the form of two octagons, the upper and smaller resting upon the lower and greater. The frontal running to the top of the fourth storey with the octagonal towers above gives a whole effect of a most impressive nature.

From the floor of the basement to the top of the tower is a distance of 112 feet. The upper tower is 26 feet high and the lower is 40 feet high. The construction is of steel, the floors being of a combination of tile and a section of concrete, this system being patented under the name of the Johnston floor system. A beam system of concrete construction is used. The building is 170 feet by 98 feet. It consists of a basement, three full storeys, and two part storeys inside the octagonal tower.

In the interior there is a rotunda extending from the first floor to the top of the tower, with the main stairway in the centre. A unique feature of the decoration will be in the different styles of architecture carried out in the columns of the rotunda:—the first floor will be in Tuscan; the ground floor is in the Doric; the second Ionic, the third Corinthian, and the fourth Tuscan. All the columns will be visible from the foot of the main stairs on the first floor of the building.

The main entrance and floor of the rotunda will be of white and green Missisquoi marble. The stairs are of steel, with marble treads and landing 6 feet square half way up in each storey. The entrances from the rotunda to the different portions of the building will be fitted with ornamental plaster arches. The floor throughout will be of maple with the exception of the rotunda and the main halls, the latter being of terrazzo with marble border. The ceilings will be of

The Dormitory Building under construction at the new provincial agricultural college at St. Vital, Man.

plaster, beamed and corniced. The outside steps are of Kettle River stone. The effect of the interior decorations will be heightened by the light from amber colored lights in the dome.

The heat is circulated through the administration building by means of fans, one in the basement which will fan the air into the building and another in the roof for fanning the foul air out. The heat passes from the heating tunnel through an air washer, then through re-heating, coils, after which it is circulated through the building by means of eight heat ducts built into the walls of the rotunda.

Administration Building under construction, Manitoba Agricultural College

Dormitory Building

The dormitory building is one of the largest of its type on the continent. The main building is 550 feet long and 50 feet wide. It covers an area of 60,650 feet. Two thousand eight hundred separate pieces of sash are being used in the work in this building alone. Seven million brick will be required. The footings are, on an average, 8 feet wide. The roof is of Spanish tile.

The dormitory is four storeys in height, including the basement, and beneath the basement is a sub-basement. The height from the foundation to the roof is 50 feet. The total height to the top of the main tower in the centre is 100 feet. The building consists of the main and central part and seven wings, the latter covering on an average 50 feet by 110 feet. The upper storeys are reached by four elevators and ten stairways. The building is of steel construction, having a steel frame with concrete floors and beams and brick walls. The stairs are of steel, with marble treads. The trimmings on the outside are of Tyndall stone. The floors of the baths, lavatories and halls are of terrazzo throughout.

The dining room is an exceptionally fine room, 100 feet by 100 feet. It is situated in the central portion of the building. The theatre is situated directly above the dining room. The floor is sloping and overhead is the dome of the central tower. Two gymnasiums are provided, one for the male students and one for the female students. The former is 80 feet by 64 feet and 40 feet high. The latter is slightly smaller. The gymnasiums have galleries 8 feet wide running round the sides at a suitable distance from the floor. These galleries rest upon cast-iron columns, carried by brick piers. The galleries may be used either as running tracks or for spectators. In the basement are two plunge baths, one for the male students and one for the females. These plunge baths are each 20 feet by 40 feet. In addition to the plunge baths the building is equipped with 16 bathrooms, 16 lavatories and 16 water closets.

The Power House

The power house is built of brick of a type and appearance uniform with the other buildings. The floors are of reinforced concrete, undermined with steel beams. The floor slabs are 7½ inches thick. The roof trusses are 90 feet in length. The boiler room is 54 feet by 69 feet. The steam will be made with a battery of four boilers. Four auxiliary boilers will be provided, giving a battery of eight in all. The boilers will be slung on 2-inch steel rods. The firing will be done by automatic stokers. The drums are of five and one-half tons each and will develop, if needed, 3,000 h.p.

One of the features in connection with this building is the arrangement for the handling of fuel. The coal will be stored in a basement below the ground level. This room has a heavy concrete floor and a roof of the same material 12 inches thick and supported upon 8-inch steel columns. Upon this roof the rails of a spur of railroad will be laid. It will be possible to shunt the cars to a point directly above the fuel room and unload the fuel through the manholes.

The smokestack in connection with the power house is 150 feet high. It is built of radial brick supplied by the M. W. Kellogg Company. It is octagon in shape at the base and 7 feet 6 inches in diameter at the ground level and 5 feet 6 inches at the top. The ashes are carried away from the furnaces in small carts running on tracks laid beneath the floor. The ashes will be dumped in a cellar at ground level.

The Chemistry Building

The chemistry building will be absolutely fireproof. Its entrance, which is its chief architectural feature, is a symmetrical combination of arches and columns, the effects being square and the whole being surmounted by a frontal at the top of the third storey.

The material used in this building and the styles of construction are similar to that of the dormitory and administration buildings. In the centre is an octagonal rotunda lighted by a skylight and from which all the rooms are easily accessible. The floor in the basement is of concrete and the remaining floors of terrazzo. Metal sashes are used and the roof is of Spanish tile. The partitions are of hollow tile.

The Biological Building

The biological building will be 99 feet front and 76 feet long. The floors of the corridors are of terrazzo. One of the features in connection with this building will be the conservatories to be build at the back. These will be three in number, all adjoining each other and the main building, the largest being in the centre and the two smaller ones on each side. In size, the three combined will be 99 feet wide and will extend 50 feet to the rear. The walls will be of brick and stone and the super-structure of steel.

Outsides of Buildings are Uniform

So far as the materials used the outside of the buildings now under construction will be uniform. Mottled pressed brick, obtained from Hebron, N.D., has been used in every case in the outside construction of the buildings. Tyndall stone, quarried in the Tyndall quarries, at Tyndall, Man., has been used throughout in the trimming, the columns and for similar purposes. The brick is of a rich brown shade and, in contrast with the grey stone, gives a most impressive effect. The buildings will be roofed in Spanish tile, with the exception of the power house, the roof of which will be of galvanized iron made into an imitation of Spanish tile. As much as possible of the materials used has been obtained from products of the province.

The Heating System

One of the features of this institution is the system employed for lighting and heating. The heat is provided from the power house and carried to the various buildings through a large tunnel lined with concrete. The first section of this tunnel extends from the power house to the tunnel. This section is 7 feet 6 inches wide and 6 feet 6 inches high. From that building to the administration building it will be 6 feet 6 inches high and 6 feet 6 inches wide. From that point it will ultimately branch in different directions. These branches will be 3 feet 6 inches wide and 6 feet 6 inches high. The level length of the tunnel will be 2,000 feet. Manholes will be installed every 500 feet. The tunnel will be lighted throughout with electricity. The floor of the tunnel will be 6 inches thick and below that will be footings 6½ inches thick. The walls will be 12 inches and the top 10 inches in thickness. The cement will be thoroughly waterproof. The pipes carrying the steam to the various buildings will be carried on iron brackets. These pipes will be of various sizes:—that leading from the power house to the dormitory will be 10 inch; from that point the pipes will be 8 inches in size and the sizes will gradually decrease until some of the smaller buildings will be connected with the system by 2-inch pipes.

The work has been carried on under considerable difficulties. Operations were commenced in April, 1911. Many delays have occurred at various times. in several cases there has been a shortage of materials. During the present summer the continued rains caused a great deal of difficulty and at other times the work has been delayed because of a shortage of men. The site was previously unoccupied and unimproved, and the work has included the installing of all the facilities, including a spur track, roads, wells, temporary homes for the men and foremen, as well as sanitary facilities. A quantity of heavy gear has been used in the work. At one time Thos. Kelly & Sons had ten engines at work on the dormitory building. The equipment used on the administration building included several ten-ton derricks. The number of men employed has averaged in the vicinity of 500 since the beginning of operations. It is planned to open the college in October, 1913. Building operations have progressed at this time to such an extent that the outside work in connection with the dormitory and administration buildings has been practically completed. The heating tunnel will be completed within a few weeks and the heat will be turned into the two buildings mentioned about Dec. 1. The work of construction in connection with the power house has been completed and the boilers are now being installed. The chemistry building and horticultural building are at an earlier stage.

The architect of the buildings was the late Mr. Thomas Hooper, provincial architect of Manitoba. The work was completed and is being carried out under the supervision of Mr. Victor W. Horwood, the present provincial architect. The Carter-Halls-Aldinger Company, of Winnipeg, are the general contractors for the administration building and the power house. Messrs. Thos. Kelly & Sons, of Winnipeg, are building the dormitory, the horticulture and the chemistry buildings, and Messrs. Cote & Benoit, of St. Boniface, have the contract for the heating tunnel. The building of the tunnel is being carried out under the inspection of Mr. E. F. Head. The Dominion Bridge Co. is providing the structural steel for the dormitory building. The Vulcan Iron Works is supplying the steel stairways. T. Kelly & Sons supplied the common brick and the Hooper Marble Works the marble and tile. J. W. Wright is installing the plumbing and heating. The Taylor Decorating Company is doing the painting and similar work. The Dominion Equipment and Supply Company has the heating and lighting contract. The Western Stone Company supplied the stone, and the Western Plaster Company had the contract for the plaster work. The boilers in the power house are of the Babcock & Wilcox type. The vault doors and similar equipment were supplied by the Carey Safe Company. The pressed brick for the outside construction were supplied by the Hebron Fire and Pressed Brick Company. The Winnipeg Ceiling and Roofing Company has a large contract in connection with the roofing and the Sprague Lumber Company supplied the factory work.

Representatives of the Toronto Harbor Commission recently held a conference with members of the Dominion Government relative to the proposed harbor improvements at Toronto. Although the meeting was a private one and no details of the discussion have as yet been made public, it is understood that a plan for a thoroughly equipped and up-to-date harbor was laid before the Government. The scheme is believed to be of wide scope including a thorough study of the whole harbor situation. The Dominion Government will be asked to co-operate with the city of Toronto in carrying out the proposed project which will cost millions and give Toronto one of the finest fresh water harbors in the world.

A new process of making artificial marble is, says the Builder, being employed by a Hessian firm. The old-fashioned artificial marbles were usually made of powdered stone, sand, and a bond—usually lime or cement, or a mixture of these. According to the new process, calcined limestone, such as is used for making lime mortar, is artificially re-transformed into lime carbonate, and then artificially colored to produce the desired patterned or veined effect. The calcined lime is subjected to the action of carbonic acid gas at about 110 deg. Cent., at which temperature a chemical combination takes place. No pressure is employed. The necessary carbonic acid gas is obtained from lime kilns, breweries, or other cheap sources.

Water Bond Macadam

By James Owen, Consulting Engineer, Newark, N.J.

IN older times a well constructed road could be used for four, five or even ten years without consideration of repairs. To-day all this is changed and the maintenance problem often commences before construction is ended. With the steadily increasing use and increasing wear of the old water-bound macadam a demand for some other binder became insistent. All kinds of material and all kinds of methods were put on the market.

The fundamental principle governing the proposed change was the substitution of a bituminous boud for the old water bond. More or less success followed the application of the innovation, mostly less. Then, naturally, was introduced the cost of producing such a road. Claims of small increases of cost of the new binder over the old were not always realized, and with this was a decided uncertainty of results; consequently road builders are, it may be said, awaiting results. Another factor entered at the same time the dust problem. Why communities that had partially suffered from this discomfort for years should have suddenly aroused from the Atlantic to the Pacific and demanded relief from the dust nuisance is a psychological phenomenon difficult to explain. Thus the dust problem became paramount to road maintenance, and its suppression became the first duty.

Heavy oils, light oils and materials with no oil at all, were tried as dust preventatives. Steady experiments have been made with these suppressors and as a rule dust is being suppressed, but sometimes with disastrous results to the roads.

Economy of Using Best Material

In the end it is cheaper in road construction to use the best material with a longer haul rather than a local inferior material that lasts a shorter time. This point is not as prominent as heretofore, for the fact is assumed that interjection of a binder as a surface coating eliminates the grinding tendency due to steel tires, and the rubber tire has a distinctly disturbing effect rather than a grinding effect, so in this fact there is a distinct gain in the loss of wearing material in any kind of traffic. Gravel, shale, chert, limestone, and granite can all now be used with success if properly handled in construction and if the material is of sufficient consistency to resist crushing; provided further that suitable foundation and proper drainage is afforded. Recognizing this fact in road construction a great change in practice may follow, with cheaper final results but with a more onerous burden in the construction.

If water-bond construction is not superseded surface protection should be considered as an integral part of the work. To-day a fairly large proportion of the good roads of the country are being protected by some coating or other, and it may be also fairly assumed that for a while a large proportion of the road construction now under way or about to be pushed, will be of water-bond type. Given, therefore, drainage and foundation as accepted, we have the diverse mineral aggregate with the varied coating materials superimposed.

The first point to be attended to is that the finished roadway should be smooth, and if possible worn down before application of surface coating. This, curiously enough, is sometimes hard to get. Take a finished surface of any material with fine aggregate on top, and no amount of rolling will give the smooth surface that iron or steel-shod wheels furnish. Rubber-tired autos alone do not give the desired results except very slowly. The combination of the two, which is generally the actual condition, will do the work, depending somewhat on the amount of clay or loam in the aggregate, and here comes up another question. Will, with clean stone delivered and rolled, the interjection of a binder of clay or sand act deleteriously to the application of the surface coating? The results of practice are eccentric.

In the writer's experience a road coated with a trap surface of new stone, rolled and covered with a slight coating of loam, on top of which screenings were spread and rolled, then travel allowed to make the road smooth, after which a coating of oil was applied, made a good road,, the oil lasting well. In another case the old surface was covered with loam and allowed to wear smooth; then the oil was applied with good results. This covering, which was of heavy asphalt oil, was placed on the road in June and some of it was apparent the next spring. In cases where the surface was broken and the packing applied, and then the oil put on before consolidation, the remedy was worse than the disease, as the broken area enlarged instead of disappearing. So far, average travel and a smooth surface is absolutely necessary for the application of any surface coating.

For automobile travel alone, the reverse seems to be applicable, for with a coating of screenings applied on the surface, then a coating of oil, there is no consolidation, or but little, no dust, no wear, but just the coating of screenings moved about by the auto wheels, with of course extra traction, which automobile drivers seem to ignore. All these remarks apply generally to all media with the surface application.

Broadly speaking the surface coatings may be classified as those containing oil and those without it. The oils may be further divided into asphaltum and non-asphaltum. The heavy asphaltum oils came into prominence and were extensively used for some years, but their application caused such deterioration of the surface by pitting and peeling that their use has been discouraged. Non-asphaltum oils are now under recommendation and a number of other materials, such as glutin, calcium chloride, etc., have been extensively used.

The efforts made during the past few years in the penetration and mixing line have not resulted in uniform success in construction or cheapness in maintenance, and furthermore the results have been that in efforts to reconstruct 1 mile of ideal road, from 5 to 10 miles have been neglected on account of lack of money. This should act as a restraining influence on undue expenditure for uncertain methods which has been the late experience with a consequent dissatisfaction on the part of the travelling community, the taxpayers.

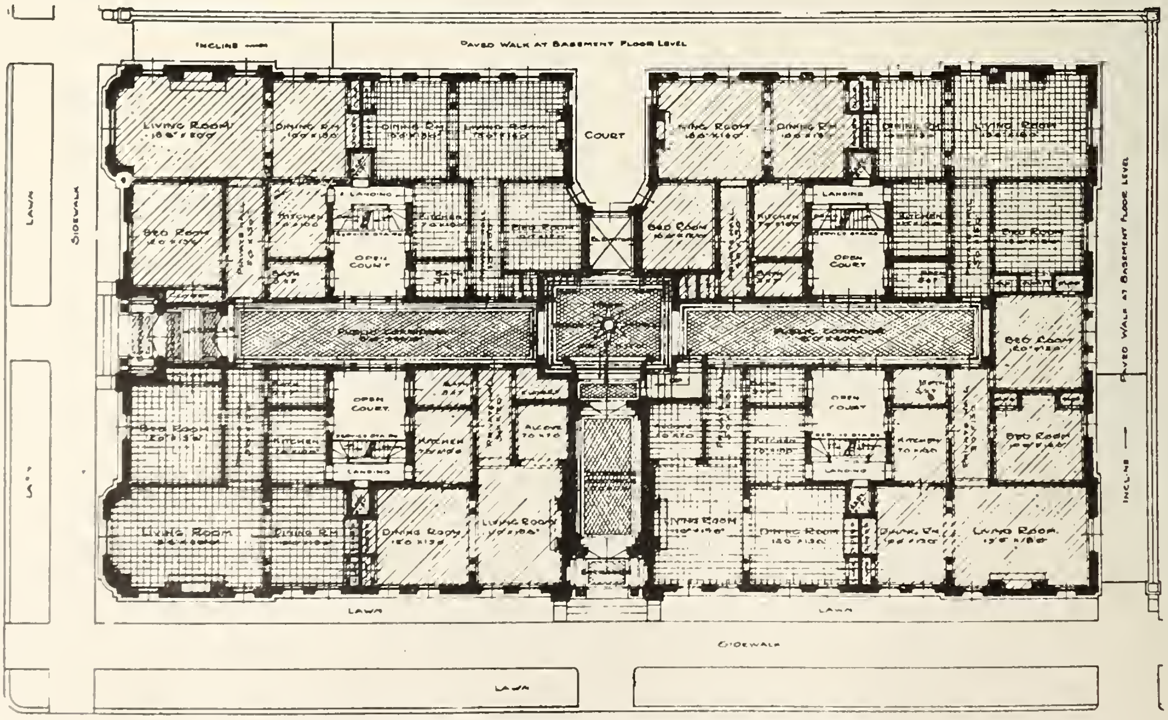
Mr. E. A. James, engineer to the York County Highway Board, in an address before the Engineering Society of the University of Toronto on the subject, "Suitable Types of Country Highways," expressed the opinion that the construction of good roads in rural Ontario would be slow for a number of years because of the scarcity of trained road-builders. Mr James attributes this scarcity to the fact that the construction of good country highways in Ontario is a comparatively recent undertaking.

Hammond Apartment House, Calgary

We reproduce herewith perspective and floor plans of the Hammond Apartment House, for which a permit was taken out recently at Calgary, and which is to be erected by the Hammond Realty Company, Limited, at an estimated cost of $200,000.

Proposed Hammond Apartment House, Calgary

The building will be 70 feet by 130 feet in dimensions and will be either of reinforced concrete or of steel construction, fireproof throughout. It will be one of the most completely equipped structures of its type in the west. There will be seventy suites of apartments and the building will be served by four passenger elevators and one freight elevator. In the basement there will be conducted that most modern development of the restaurant trade, a cafeteria, while the roof will afford a garden, banquet and lecture rooms. The structure will be erected, as shown, to the height of eight storeys. Electric lighting, steam heating and modern plumbing will be installed. Among the various other lines called for in the equipment of the building are store fixtures, grille work, fire escapes, speaking tubes, telephone and ventilating systems, boilers, etc. The architects are Messrs. Hubbell, Kelly Company, Ltd., of Calgary and Spokane.



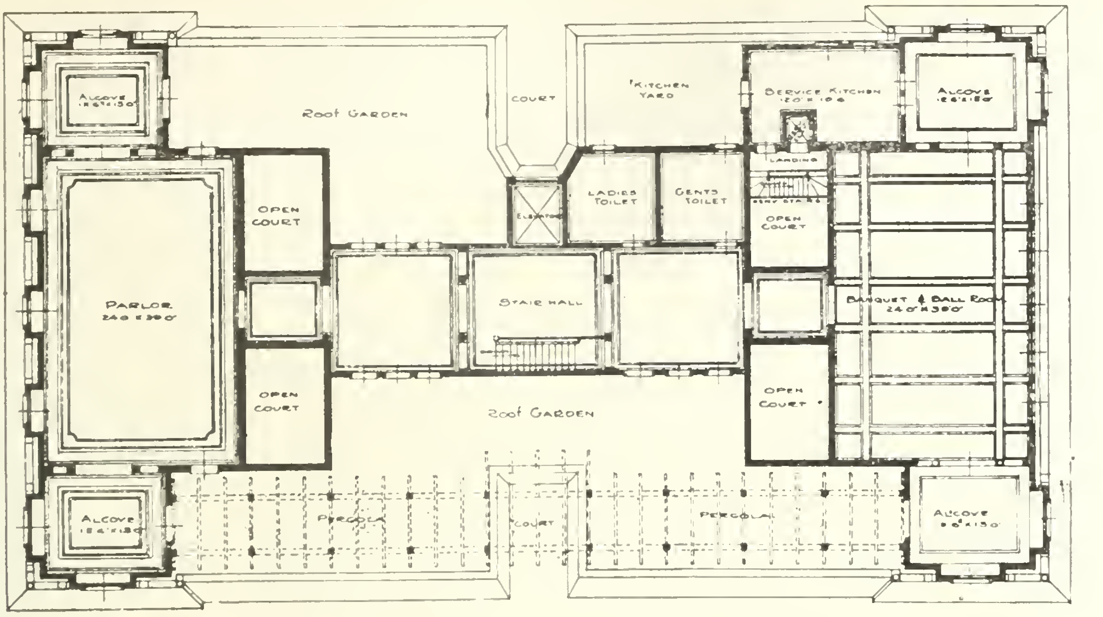
First Floor Plan, Hammond Apartment House, Calgary

Economical Design of Moulds

It is generally recognized that one of the prime reasons for the comparatively high first cost of reinforced concrete buildings is the cost of the material and labor put in the forms, says Cement Age. Therefore continued efforts to reduce this item to a minimum are being made by many construction companies. A recent case is illustrative of the possibilities of saving even on small jobs by designing the forms in the drafting room instead of putting the fitting up to the carpenters' shop.

The job in question was a small structure costing about $26,000, and 50 ft. by 50 ft., four storeys high, and built by the Aberthaw Construction Co. of Boston. The design was of the beam and girder type, and was made as regular as possible in order to keep the cost down. In spite of this, 113 different kinds of forms were required, making a total of about 600 forms in all, taking about 10,000 sq. ft. of stock. When it is considered the figures do not include any of the ledges, studs, or anything but the beam and column sides, it will be appreciated that 113 different kinds of forms is a large number for a plain small job.

By former methods, the carpenters usually not only made the beam sides but fitted them as they

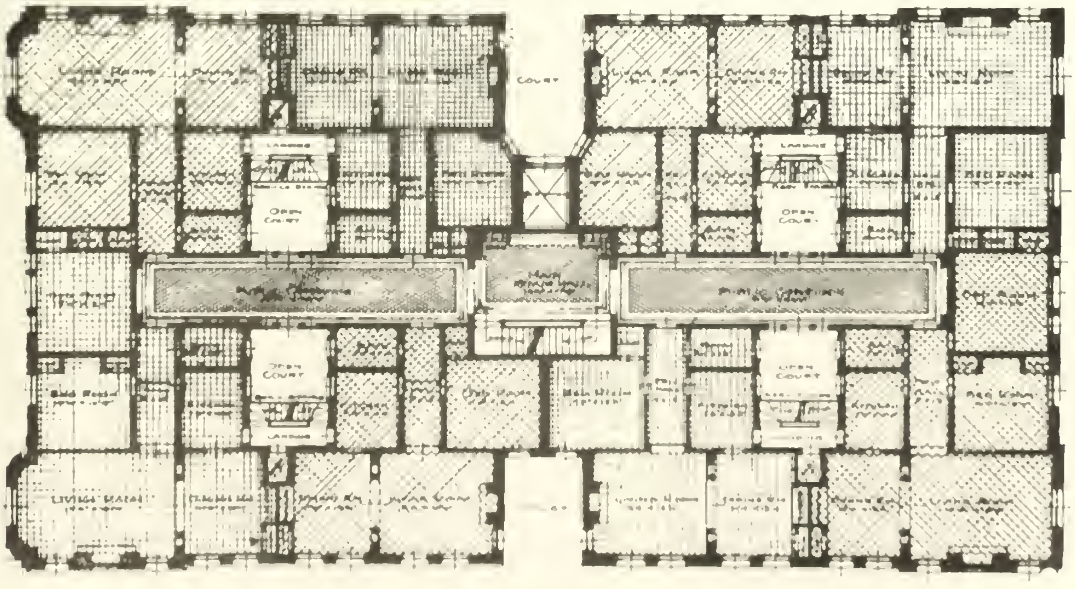


Roof Garden Plan. Hammond Apartment House, Calgary

went along, and each one had to be sawed out. A large saving is therefore made by designing the forms for this small job in the drafting room, as the cost of drafting is very much less than the cost of making up the beams and fitting.

Removing a 3-Storey Brick Building

A recent issue of the Engineering Record describes the manner in which a large three-storied brick building was raised bodily from its site, revolved through a right angle, transported 300 ft. and deposited on a new site on the opposite side of the road. The clearing operations had to be carried out within forty days, for a penalty of £20 per day for every day beyond this period would have been imposed. The building weighed 2550 tons, covered an area of 60 ft. by 105 ft., had walls 16 in. thick, and was embellished with a tower 120 ft. high. At the outset the whole weight of the building was transferred on to a series of beams supported on five longitudinal sills. Four hundred 10-ton jack screws supported the sills and by means of these the building, with the upper part of the tower removed, was raised 2 ft. in about two weeks. A cast iron ball-bearing pivot was disposed beneath the building at its centre of gravity, and roller planks laid around it. The weight of the building was then transferred to 500 8-in. rollers 4 ft. long. Tackle and a number of two-horsed capstans were then employed to revolve the building. This process occupied another two weeks. The roller planks were then removed and longitudinal track timbers set in their place. The rollers were again inserted and the building steered across the road to its new site, where suitable foundations and cellars had been prepared for it. The building was cleared from the old site in just forty days after the contract was signed and was lowered on to its new foundations six days later.



Typical Floor Plan, Hammond Apartment House, Calgary

Constructional News from the Coast

1912 a Record-Breaker—Activity General throughout the Province—Interesting Details of the More Important Undertakings

Vancouver, Oct. 30, 1912

CONSTRUCTIONAL activity at Vancouver still progresses in a manner unprecedented in the history of the city at this season. Although October is admittedly a slack month in the building trades at the Coast, yet the record up to date is highly encouraging, indicating a substantial increase over the corresponding period of 1911. In the field of architectural construction the whole province has thus far in 1912 made a remarkably fine showing. Vancouver is naturally the provincial leader in volume of business, but in proportion to population Victoria, New Westminster, Prince Rupert and other cities have returned equally satisfactory statistics.

In 1911, Vancouver's building permits totalled a value in the neighborhood of $17,000,000. For the first six months of the present year the city has broken about even with last year's business for the same length of time. Permit values have decreased very slightly, while to offset this, the number of permits issued has materially increased. Considerably more buildings are being erected this year, but the cost per building is less than in 1911. This may be accounted for by the fact that the number of dwellings and apartments is much greater, while a monetary stringency both at home and abroad has somewhat handicapped larger building interests in Vancouver, as is the case in many other Canadian and American cities.

In point of financial outlay, buildings for office purposes have obviously entailed a heavier expenditure than have other structural types. Over seven and a quarter millions of dollars has been set aside for this class of work. Next in order of importance come proposed hotels, representing $2,480,000 for hotel purposes only. These figures do not include $2,448,000 for apartment houses, or store buildings with overhead rooms, or lodging houses, at a value of $1,121-000. And other buildings of the same general type are those classified as "stores and apartments," at a value of $1,400,000, as distinguished from exclusive apartment buildings, lodging houses or individual rooms, and hotels.

The New Weart Building

Considerable interest has been aroused in Vancouver constructional circles by the announcement that an early start will be made on the erection of the new Weart Build-

The proposed Weart Building, Vancouver.

The Rogers Building, Vancouver, erected by Messrs. Purdy & Henderson, contractors, at a cost of 600,000.

ing at the corner of Hastings and Richards streets. The building will measure 78 x 120 feet, and will be fifteen storeys high with full basement. The structure is steel skeleton frame, particular attention being devoted to fireproofing methods. The foundations will be carried to rock and the basement fully waterproofed. The three lower storeys are terra cotta with a polished granite base. Eight storeys above this are face brick and the four remaining upper storeys are terra cotta. The spaces between the piers of the two lower storeys are finished in marble and bronze. The main entrance corridor is designed in the same architectural style as the exterior, the walls and floors being marble with bronze trimmings and the ceiling oak beams and panelling. The main floor is planned so that the corner can be occupied by a banking institution with main entrance directly facing Hastings street. The main corridor is entered from a general vestibule twenty-five feet wide which leads to the basement stairs on one side and the bank entrance on the other.

The typical floor contains thirty offices with all modern equipment. Oak is employed as interior finish throughout. The corridor floors are Terrazzo tile with marble borders. The fact that the building is fifteen storeys high and that the upper storeys will never be obstructed by adjoining buildings gave the architects a chance to treat the four sides of the building in a decorative manner which presents a tower architecturally finished on all sides. The pinnacles above the fire walls are equipped with electrical illuminations. In designing the building the architects adopted the style best known as Francis 1, in which the general effect is based on Gothic traditions, but the details are Renaissance, a blending of classic and Gothic decorative forms. In this style the wide, over-hanging cornice is omitted, and the upper portion of the structure recedes somewhat instead of over-hanging, the ornamentation being transferred in a considerable measure from horizontal to vertical lines. The decoration usually employed on a heavy, cornice is, in this building, expended on its crowning tracery and pinnacles.

The Rogers Building

Another illustration shows the recently completed Jonathan Rogers Building situated at the corner of Granville and Pender streets, Vancouver. This structure, ten storeys in height, is of steel and reinforced concrete construction throughout and contains besides three of the handsomest stores in the city on the street floor, 350 offices on the nine upper floors. The building is 100 x 122 feet in size with facing of cream colored terra cotta and polished Glasgow granite. The style is of the modern French Renaissance. The interior finish is of hardwood, with white Italian marble in the corridors and stairs. One of the special features will be a power plant, which will be capable of furnishing light and power and operating the ventilation system The elevators installed are the first of the type to be used in Vancouver, being the worm gear traction type in use in the forty-storey Singer Building in New York The architects for the structure were Messrs Gould & Champney, now Gould & Woods . The general contract was carried out by Messrs. Purdy & Henderson at a cost of $600,000. The construction has taken considerably over a year.

An important deal was recently completed at Vancouver whereby the Royal Bank of Canada purchased 130 feet on the north east corner of Hastings and Granville streets for a consideration of $725,000, the price per foot front being $5,575. This is stated to be the highest price ever paid in Vancouver. It is the intention of the Royal Bank of Canada to erect a modern building on the property at an approximate cost of $500,000, the ground floor to be used by the bank for its main office in this city.

The Belmont Block, Victoria, under construction

The New Belmont Block

A photograph reproduced herewith shows progress on the construction of the new Belmont Block on the corner of Government and Humboldt streets, Victoria. The building is of reinforced concrete construction and will be eight storeys in height when completed. The excavation for the foundation had to be done in solid rock and this work alone cost upwards of $25,000. The cost of the entire building is approximately $400,000. The Norton Griffiths Steel Construction Company have charge of the contract.

Merchants Bank Branch

Preliminary work on the construction of the new Hastings street branch of the Merchants Bank of Canada was recently commenced by the Norton Griffiths Steel Construction Company. The building will have a frontage of 27 feet on Hastings street and 79 feet on Carral street and will be of steel frame and concrete construction with stone facing. The ground floor will contain the banking quarters, vaults, and safe deposit boxes. The upper floors will be reserved for offices and sleeping quarters for bank employees.

The proposed branch building of the Merchants Bank on Hastings St., Vancouver

The cost of the building is placed at approximately $100,000 The structure is so planned that seven additional storeys may be added when desired Messrs Somervil & Putnam prepared the plans

A permit was taken out recently for the erection of an eight-storey brick and stone rooming house on Carral street This structure will measure 66 x 120 feet and will cost in the neighborhood of $70,000. The interior finish throughout will be B. C. fir. Mr. J. G. Price, who designed the building, will also carry on the work of construction.

A feature of the six-storey reinforced concrete building now being erected on Seymour street, near Robson, is that the stores to be situated on the ground floor and in the basement will contain no posts. The upper floors will be supported by the walls and cross beams. The structure will occupy a lot 50 x 120 feet. Pressed brick, buff colored, and terra cotta of the same shade are used for facing. Hollow tile will be used for the partitions and cement for the floors. There are 130 rooms in the building, which are to be fitted up with all modern conveniences. Messrs. H. L. Stevens designed the structure and are handling the general contract. The cost complete will amount to $95,000.

Tenders were let recently for the construction of a six-storey apartment building on Seymour street, Vancouver, between Georgia and Dunsmuir streets. This structure will measure 50 x 120 feet and will be erected at a cost of approximately $80,000. The building will be of mill construction, faced with fancy pressed brick, trimmed with stone, and will contain 140 rooms. Mr. Fred. J. Peters is the architect.

Work was commenced recently on a six-storey mill construction hotel building at the corner of Hastings and Dunlevy streets at a cost of $120,000. The exterior construction will consist of buff pressed brick trimmed with sandstone, and surmounted by a cornice. The building will contain 194 rooms. Fir is used as inside finish. The Dominion Construction & Supply Company prepared the plans and will also have charge of the contract.

Hotel Building for Richards Street

Construction will soon be commenced on a new hotel building to be erected on Richards street, Vancouver, between Pender and Dunsmuir streets. The building will measure 50 x 120 feet and will be seven storeys in height. It will be of steel mill construction, faced with fancy pressed brick with sandstone trimmings and will be built to allow for the future erection of a large annex on the adjacent lot. A large entrance lobby on the ground floor will be elaborately finished with tile floors and marble wainscoting. From the lobby, access will be had to a spacious dining room, which will be finished with mahogany wainscoting and oak flooring. Each of the six upper storeys will contain 26 rooms, which are panelled in B. C. fir. The building will represent an expenditure of approximately $150,000. Mr. Emil Guenther prepared the plans.

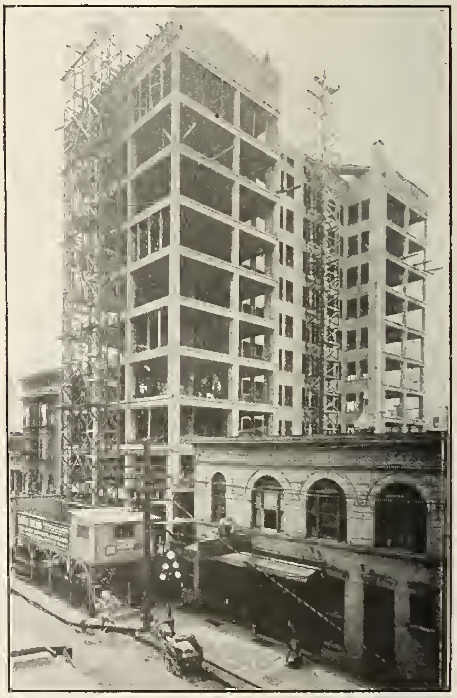
Funds are being raised amongst the Methodist community at Vancouver for the erection of a new church at the corner of Larch and Second avenues. Plans for the new structure are not yet completed, but it is stated that the building will have a seating capacity of 1,230 in the main auditorium. The Sunday School section, which is to be built first, will have an additional capacity of 900. The entire building is estimated to cost a little over $100,000.

It is reported here that the National Drug Company of Canada intends to erect a reinforced concrete business block at Vancouver within the near future. The building will measure 100 x 120 feet. Plans are in course of preparation.

Powell street near Jackson avenue is to be the site of a four-storey mill construction rooming house which will occupy a lot 25 x 120 feet. White glazed brick will be used for the front exterior facing, while ordinary red brick will be used on the remaining exterior walls. Forty-five rooms are contained in this building which will cost $25,000. Messrs. Jones & Caspell are the architects. Construction will shortly begin on a three-storey apartment house to be erected on Powell street, between Columbia and Main streets. This structure will cover an area 50 x 100 feet, and will be of mill construction faced with buff-colored pressed brick, and sandstone for window ledge trimming. Two stores will be situated on the ground floor, while the upper storeys will contain 48 rooms. The interior finish is B. C. fir. The cost of this building is placed at $40,000. Mr. W. F. Gardiner is the architect and Mr. E. J. Ryan has been awarded the general contract.

The New London Building

The new London Building which is being erected for the London & British North America Company will, when completed, be one of the finest buildings in Vancouver. The structure has a frontage of 52 feet on Pender, half-way between Granville and Seymour streets, and will extend back 120 feet. It will be ten storeys in height, with full basement, and will be constructed of reinforced concrete throughout. The front of the building is to be completely faced with Haddington Island stone, carved and surmounted by a cornice of the same material. The remaining walls are to be covered with hollow brick. To guard against fire, all partitions will be hollow clay tile and in the flooring of the halls and corridors, Terrazzo tile with marble borders are used. The entrance hall is to be finished in marble and all corridors will be panelled with this material to a height of three feet. Maple will be used as inside finish throughout. The completed building is estimated to cost approximately $275,000. Messrs. Somervil & Putnam were the architects.



The London Building, Vancouver, in course of erection

Rapid progress is being made on the construction of the new $200,000 theatre and office building which Messrs. Sullivan & Considine are erecting on the site of the old Vancouver Opera House on Granville street. The steel columns to support the balcony and gallery are already in place and work is will under way on the concrete foundation. In order to make the building 32 feet longer than formerly, the entire rear portion of the theatre had to be torn down, and excavating dug, and the rear portion rebuilt. It is expected that the new theatre will be completed during December.

Large Apartment Block

A huge apartment block is now in process of construction on Alberni street, Vancouver, near the corner of Burrard at an estimated cost of $600,000. The building, which will occupy a lot 70 x 132 feet, will be ten storeys in height. Reinforced concrete, faced with stone to the second floor and pressed brick and terra cotta above, will be used. The building will have sixty three-room suites and fifty-eight two-room apartments. Oak will be used as interior finish throughout. Marble treads will be used on the main staircase, and the same material is to be employed for wainscoting. Two bronze elevators will be installed. A fan ventilating system and a steam heating apparatus in the basement complete the equipment. The J. J. Fronz Construction Company, Limited, have charge of the construction.

The new Molson Bank building on Hastings street east, Vancouver, is fast nearing completion and when finished will rank as one of the finest structures of its class in the city. The building is six storeys in height, of steel and concrete construction and will cost $100,000.

School Expenditure Heavy

Vancouver school expenditures this year are heavy, being in the neighborhood of $1,750,000. This sum includes an appropriation of half a million for the proposed British Columbia University buildings to be started in Point Grey this Fall, also two denominational buildings and the usual non-sectarian institutions.

About half a million represents Vancouver's hospital appropriation. Approximately half this amount will also be spent in New Westminster.

In the commercial field there is a good demand for warehouse space and several buildings are planned or already under way for that purpose.

Activity in residential work is without precedent. One firm alone is building over two hundred bungalows this year, while more costly structures are going up all over the city. The better class of dwellings range in cost from $10,000 to $50,000 and the number is apparently unlimited.

Survey of North Arm Completed

Messrs. M. H. Davy and O. LeFebvre, Dominion Government engineers in charge of the harbor survey at Vancouver, have completed all the work necessary in the survey of the North Arm of the Fraser River and plans showing the completed results of the work have been forwarded to Ottawa. The maps, which cover all the territory between the extremity of the banks at the mouth of the river in the straits of Georgia and New Westminster, will provide the basis on which the Department of Public Works will prepare its plans for the improvement of the waterway. Soundings have been taken all the way upstream and depths are shown on the maps. Contours and elevations as far back from the highwater mark as will be necessary in determining the scheme of harbor improvements are also shown.

All records of expenditure in connection with work on the C. N. R. on Vancouver Island and on the British Columbia mainland were surpassed during September. According to the estimates prepared at the executive offices in Vancouver the total disbursements for that month reached $1,451,000, as compared with $1,100,000 during August. The figures comprise payments to railway contractors as well as general engineering expenses. There are now on contractors' payrolls and in the engineering service of the railroad company a total of over 6,000 men, the largest number employed in any one month since construction work was started several years ago. A good many more millions will be expended before the new line is linked up with the prairie section.

Definite announcement has been made by the C. P. R. that the new terminal yards at Coquitlam, B.C., will be in use by December 15th. All officials and operators affected by the change have been ordered to prepare to change their headquarters at that date and to accommodate them a small colony of residences is now springing up under the supervision of the Coquitlam Construction Company and private individuals.

Work is now proceeding rapidly on the large unloading docks which are being constructed on False Creek, Vancouver, for the Palmer Land & Investment Co. These docks are 340 feet long, have a frontage on the water of 175 feet and will cover all the territory from the building on Main street to False Creek, from the B. C. Electric car barns up to, and including, the remains of the large warehouse occupied by Messrs. Champion & White until its destruction by fire recently.

The wharf will be divided into two sections by a 25-foot roadway running down the centre. On either side of this road will be warehouses, twelve in all, of which ten will be 75 x 50 feet, and the remaining two 75 x 83 feet. These buildings will be of frame construction covered with galvanized iron with 2 by 4 crib partitions. With the exception of the two larger sheds they will be used for storing coal and other materials. The two large sheds will be at the extreme end of the dock, one at each side of the roadway and will be used for unloading scows. Here there will be slips into which the barges will be run and unloaded when the tide brings them up to the level of the floor of the warehouse.

The dock is being built on a pile foundation and will carry a load of 350 pounds to the square foot. Over 700 piles were used in its construction. The dock and sheds will represent an expenditure of over $10,000. Mr. A. F. Heide is the architect for the work.

New Industries for St. John

A sugar refinery which will turn out 2,000 barrels a day, is to be erected within two years at St. John. Messrs. Mitchell & Casgrain, of Montreal, will deposit $100,000 with the city to ratify the agreement.

Mr. W. Burton Stewart, general manager for Canada of the Norton-Griffiths Construction Company, announced that his company would acquire the charter of the Imperial Drydock Company and would construct in Courtenay Bay a dock of more than 1,150 feet in length. The company will also develop the drydock and ship repairing plant into an immense steel ship building industry, and will use their best endeavors to found iron and steel works on the site adjoining the drydock. He estimates that the steel plant alone will employ between 1,000 to 2,000 men, while the development of the ship building plant is limitless in its possibilities. The establishment of these important industries at St. John should prove a large factor in the increased prosperity of that city.

A large amount of British capital will be put into a scheme for constructing a railway line from the Pacific Ocean to the Hudson Bay, to be known as the Alberta, Peace River and Eastern Railway. The Minister of Railways has just sanctioned the first section of upwards of four hundred miles, or about 25 per cent. of the total length as at present provided by charter. The company's engineer in chief, Mr. J. H. Williams, has had experience in railway and bridge work in Australia, India, Ceylon, England, and the Malay Peninsula, where for several years he was general manager of the Government railways.

Canadian Railroad Development

The engineers of the Canadian Pacific Railway are working on plans for the double-tracking of the line from Saskatoon to Sutherland.

The Grand Trunk Railway have decided to make Hamilton an important terminal point and are at present making extensive improvements to their Stuart street yards. They will probably raise all the tracks.

The floating dry dock at present under construction by the Grand Trunk Pacific Railway at Prince Rupert is to be a pontoon structure with a capacity of 20,000 tons. It will be 640 feet in length, and will cost approximately $2,000,000.

The first of the two central cantilever spans of the second track of the C. P. R. bridge being constructed across the St. Lawrence at Lachine has been moved into position. The spans are 400 feet long, and in the centre 40 feet high. The work was done by the Dominion Bridge Company, the contractors, under the direction of Mr. G. H. Duggan and Mr. F. Shearwood, and was witnessed by a large number of experts. The preparations occupied two weeks.

The Grand Trunk Pacific Railway is reported to have about completed surveys for a route between Regina and Lethbridge, and it is probable that construction work will be started as soon as the weather permits in the spring. The Grand Trunk has engineers now making preliminary surveys in the mountains for a direct line from Lethbridge to Vancouver, to be run between the main line of the Canadian Pacific and the international boundary.

Instead of building a central section of eleven storeys to cost about $800,000, the Canadian Pacific Railway will extend part of its new Hotel Vancouver structure up some sixteen storeys. This is said to be permissible so long as the base area of the portion raised above the ten-storey limit is not more than one-third of the base area of the whole edifice. The cost of the central section to be made sixteen storeys high will run to about $1,200,000 instead of $800,000.

Before the Railway Commission at Ottawa, the Montreal City Council and property owners opposed the plans of the C. N. R. to construct an overhead electric railway in connection with their Mount Royal tunnel. It was asked that the line should be placed underground, which would obviate the depreciation to property. Methods of construction and tunnelling were discussed, and Mr. Brown, the chief engineer of the C. N. R., explained that if the harbor board built an elevated railway and a bridge, a tunnel would not give connection with that scheme. He also objected to an open trench scheme as it would in this present instance cut out gas pipes and sewers. The chairman of the Railway Commission announced that approval of the scheme would be witheld until Mr. Geo. Mountain, chief engineer of the board, had made a comprehensive report on all aspects of the matter. The third year engineering students of McGill have visited the C. N. R. tunnel. They were accompanied by Profs. H. M. Mackay and H. F. Armstrong.

The Edmonton, Dunnegan & British Columbia Railway Co., with office at Edmonton, Alta., has awarded the contract for 100,000 ties to Bell & McPhee. Contracts for 300,000 ties have now been awarded and these, with ties cut along the right-of-way by Mr. J. D. McArthur, the contractor, will, it is expected, be adequate for the first 120 miles of the road. Track-laying will commence about the middle of November, according to the plans of the company. The third shipment of steel, consisting of 4,000 tons of rails and fastenings and bringing the total supply on hand to 12,000 tons, sufficient to complete the line from Edmonton to Athabasca River bridge, a distance of 120 miles, was shipped from Fort William Oct. 30.

All difficulties in connection with the building of the new Union Station, Toronto, have been removed, and the work of construction will be commenced early next year. The Canadian Pacific and Grand Trunk railways have reached an agreement on the matter and purpose to form a terminal company, which will undertake the preparation of plans and the active work of construction. The new station will be on the Front street site, between Bay and York streets. The railway companies, however, intend to prosecute their appeal against the viaduct order. They will make an immediate application to the Governor-General-in-Council to have that order set aside. The alternative plans of the railways provide for the construction of a number of bridges over the tracks. The city will strongly protest against any change being made in the order.

Mr. Clarence Hoard, 401 Pemberton Block, Victoria, has the contract for 10 miles of line between Union Bay-Courtenay, Vancouver Island, on the Comox Extension of the Esquimalt & Nanaimo Railway. The contract includes 100,000 cu. yds. earth excavation, 2,000 cu. yds. concrete masonry, from 300 to 1,000 ft. bridges requiring 700,000 ft. B.M. timber trestles and 100 ft. steel span. Mr. Hoard is also building seven miles of standard gauge railroad to New No. 8 shaft for the Canadian Collieries, the work requiring 200,000 cu. yds. earth excavation, 1,500,000 ft. B.M. trestles, also 80,000 cu. yds. hard pan cut for yards at shaft. The same contractor is also constructing a timber crib dam three miles above Union Bay for the Canadian Collieries. The dam is 200 ft. long and 20 ft. high, containing about 150,000 ft. b.m. of 12 x 12 cedar.

Surveys will probably be completed this month for the first section of the Ottawa & St. Lawrence Electric Railway. This company proposes a line from Ottawa to Morrisburg, Prescott and Brockville, with branch lines to other towns and villages in the Ottawa valley. The present survey is being made from a point near Holland avenue, Ottawa, the route crossing the Rideau River near Mooney's Bay, on past the Hunt Club, then straight through to Metcalfe, from there to Winchester, then to Williamsburg and Morrisburg. This part of the road will be constructed first. When it is completed connection will be made with Prescott and Brockville and a branch line will run from Metcalfe to Kenmore and Russell. It is stated that the necessary money has been subscribed and contracts already drawn up call for 50 miles of road being built in a year from next spring. Mr. E. E. Malone, Toronto, Ont., is the engineer.

Mr. Frank Cochrane, Minister of Railways and Canals, Ottawa, Ont., in a recent address at Halifax, N.S., announced the intention of the government to build new railway and ocean terminals at Halifax. He stated that the new docks are to extend for 1½ miles from the lumber yard to Point Pleasant Park and will consist of six piers 1,250 ft. long and 300 ft. in width with capacity sufficient to dock at least 30 ships. There will be one bulkhead loading pier 2,000 ft. in length at which the ocean greyhounds will land. This pier will be equipped with immigration buildings, sheds and grain elevator. A new union passenger station will be erected at the end of Hollis street, just north of the docks mentioned, which will be of ample size and suitable architecture. The new terminals will be approached, the Minister went on to say, by a double-tracked railroad which will branch off the main line at the Three Mile House and extend southerly through the low divide between Bedford basin and the head of the northwest arm.

Personal Mention

The death occurred at Berlin, Ont., on the 7th inst., of Mr. John Kimmel, formerly a contractor of that city.

Mr. Henry J. Fuller, president of the Canadian Fairbanks-Morse Company, Limited, has been elected a director of the National Trust Company.

Mr. H. P. Bell, late of London, Ontario, has opened an office in Toronto as consulting chemical engineer, with temporary quarters at 409 Kent Building.

The New President of the R.A.I.C.

Mr. J. H. G. Russell, the well known Winnipeg architect, who was elected president of the Royal Architectural Institute of Canada at the recent annual convention of that body in Ottawa, was born in Toronto and received his early training under Mr. H. B. Gordon of that city. He left Toronto for the west in 1884 and for the greater portion of the ten years following practised his profession in various cities of the western states. In 1894 he went to Winnipeg and started in practice two years later.

Mr. J. H. G. Russell, Winnipeg, President Royal Architectural Institute of Canada

Mr. Russell is a member of the Manitoba Board of Examiners of Architects. He was the 1910 president of the Manitoba Association of Architects.

Mr. J. B. Grant, formerly Inspector of Bridges of the Illinois Central Railway, has been appointed to a similar position with the Grand Trunk Railway at Montreal.

Mr. F. P. Jones, general manager of the Canada Cement Company, has gone to Venezuela in connection with the Venezuela Ore Company, of which he is president.

Prof. R. J. Durley, M. Inst. C. E., of McGill University, has been awarded the Crampton prize of the Institution of Civil Engineers of Great Britain for a paper presented during the 1911-1912 session.

Mr. A. G. Webster, of Francis Hankin & Company, Montreal, has been appointed to the Toronto office, 117 Mail Building. The company are extending their business of agents for builders' and municipal supplies.

Mr. Peter H. Hume, C. E., a well known structural engineer, died at St. John, N.B., on the 3rd inst. after a long illness. Mr. Hume had formerly supervised such important work as docks at Hong-Kong and New York, and the subway in Philadelphia.

Mr. Robert Muirhead has been appointed general yardmaster of the Grand Trunk at Toronto, succeeding Mr. Geo. Stokes, at present acting terminal superintendent. Mr. Muirhead was previously assistant terminal superintendent.

Mr. Charles A. Dunham has been appointed signal engineer in connection with the block signal system of the Grand Trunk Railway. The company are extending this system. Mr. Dunham, who was born in Hamilton, Ont., has had a long experience in the United States.

The following are next year's nominees for officers and members of the council of the Canadian Society of Civil Engineers: for president, Mr. Phelps Johnson; for vice-president, Mr. H. G. Kelley, Mr. F. C. Gamble. For councillors: District No. 1—Messrs. R. J. Durley, J. M. R. Fairbairn, W. J. Francis, Geo. Janin, F. H. Pitcher, J. M. Robertson. District No. 2—Mr. F. A. Bowman, Mr. T. C. Burpee. District No. 3—Mr. A. R. Decary, Mr. W. D. Baillairge. District No. 4—Mr. S. J. Chapleau, Mr. A. A. Dion. District No. 5—Mr. H. E. T. Haultain, Mr. C. H. Mitchell. District No. 6—Prof. E. P. Fetherstonhaugh, Mr. W. A. Duff. District No. 7—Mr. H. E. C. Carry, Mr. T. H. White.

Road Building in the Province of Quebec

The Minister of Agriculture has presented a special report on roadway improvements, stating that out of a total of 45,000 miles of roads in the province, the improvement of 8,493 miles was undertaken during 1911 under the Good Roads Act passed in the spring of that year, and he calculates that this year the improvement of 12,161 miles will have been undertaken. Up to Oct. 26th last, there had been 62½ miles of macadam roadways constructed, of which 18 miles was on the King Edward highway leading from Montreal down to Rouse's Point. There were many difficulties in connection with this latter work, including scarcity of stone and of manual labor, lack of water, and poor railway facilities for handling supplies besides a great deal of wet weather. It is estimated that 69,690 people attended the lectures on good roads in various parts of the province. There are 273 municipalities that have sought the benefit of the Good Roads Act this year. Of these, 87 asked for loans, totalling $2,788,000. Also, 185 inspections have been made and estimates prepared for 105 municipalities. These latter total $3,963,000.

It is stated that a number of British ship building concerns may establish yards and drydocks in Canada. Mr. John Reid, of the firm of Messrs. John Reid & Company, naval architects, speaking of the projected yards says that Messrs. Vickers Company, Limited, of Barrow, propose to start ship building yards and a steel manufacturing plant. Messrs. John Brown & Company, of Clydebank, and the Fairfield Company, of Govan, Scotland, are interested in the plan for Sydney, C.B. Messrs. Swan, Hunter & Wigham Richardson have purchased a site at Dartmouth, N.S., where they will establish works. Messrs. Denny Bros. of Dumbarton, are devoting their attention to the Pacific coast and Messrs. Norton Griffiths & Company, Ltd., of Canada, a branch of the London concern, have already undertaken the extensive developments at Courtenay Bay, N.B.

The Babcock & Wilcox scholarship at McGill University of $[illegible]00 for two years has been won by Mr. Blair Macfarlane, of Hamilton, Ont. The prize was for general knowledge of steam engineering, and sessional standing.

Mainly Constructional

The News in Brief—From the Atlantic to the Pacific.

Brampton, Ont., is to have a new water system. The whole town will shortly be installed with meters.

The Canadian Consolidated Rubber Company are building a new warehouse in Winnipeg at a cost of about $80,000.

Four storeys are to be added to the six-storey structure occupied by the Central City Mission, Vancouver, at a cost of $75,000.

Mr. Warren Overpack has recently purchased for about $150,000, the brick plant owned by Messrs. Birnie Brothers at Medicine Hat, Alta.

An eight-storey reinforced concrete fireproof addition will be added to the Empress Hotel, Vancouver. The cost will be in the neighborhood of $100,000.

Since June last, about 220 miles of roads have been built in the Cochrane, Ont., district, over an area of approximately one hundred square miles.

The town of Red Deer, Alta., has the creditable showing of $354,580 for the ten months' building to the end of October. Last year's figures were $234,495.

The value of building permits issued in Toronto to the end of October was $23,814,003, as against $20,306,697 in 1911. This constitutes a record for the city.

A by-law to set aside $890,000 for the electrification of the London and Port Stanley Railway will be submitted to the ratepayers of London, Ont., in January next.

The Ideal Brick and Tile Company has been incorporated with a capital of $60,000 to manufacture bricks and tiles, etc. The head office is at Brantford, Ont.

The Ontario Board of Health has informed the Sarnia, Ont., Council that the town must either build a filtration plant or pay for one built by the Board of Health.

The Pleated Construction Company, Limited, with head office at Galt, Ont., has been formed to manufacture bricks, cement, limestone and other building materials. The capital is $150,000.

A brick and tile works is to be started at Charlton, Ont. The plant is expected to be ready by the Spring. The capacity will be 30,000 bricks a day in addition to a large tile output.

The Jeffrey Manufacturing Company, Ltd., Montreal, have closed a contract with the town of Verdun, P.Q., for a coal and ash handling plant in connection with the town's power house.

With a view to obtain more capital for extending their Cote St. Paul plant and securing other property the Dominion Marble Company, Montreal, are issuing $150,000 in six per cent. bonds.

The Capital Roofing & Cornice Company, Limited, has been incorporated with a capital of $40,000 to manufacture all kinds of metal goods and contractors' supplies. The head office is at Ottawa.

Sault Ste. Marie and Steelton, Ont., are progressing so well that a model city will be commenced there next year. The enterprise will be in the hands of Mr. H. E. Mawson, the English town planning expert.

The Port Arthur House Corporation is a new concern at Port Arthur which hopes to supply the demand for workmen's flats and cottages. The company is capitalized at $250,000. It is the intention to proceed with the erection of the first block of thirty flats this winter. Mr. N. G. Neill, Industrial Commissioner of Port Arthur, is the secretary of the company.

Good progress is being made with the new road known as "Fort Garry Drive," Winnipeg, over four miles being already under construction. When completed, this road will be over seven miles in length and eighty feet wide.

The city council of Calgary recently decided to advertise for a city engineer at a salary of $6,000 a year. This is twice the present figure. The first meeting of the council in 1913 will name the successful candidate.

The Quebec Government, in the Speech from the Throne, intimate that a bill will be introduced to amend the, Good Roads Act of 1911, in order to make it more effective and to further stimulate the improvement of the highways.

Work has been started on the reinforced concrete cold storage warehouse which is being erected in Vancouver for the Merchants Ice and Cold Storage Company at a cost of $175,000. The building is expected to be ready in sixty days.

Up to the end of last month the city of Calgary expended $17,456,416 upon building work, as compared with $11,664,138 for the ten months' period of 1911. The October permits, which totalled, in round figures, $1,600,000, were double those of October, 1911.

The departure of many foreigners for the seat ot war has resulted in a scarcity of labor of the ordinary kind in Montreal and contractors are hard pushed to find sufficient help. The number of departing men is estimated at about 2000, and it is practically impossible to replace these at a moment's notice.

It is expected that a sum rather in excess of $10,000,000 will have to be provided by property owners in Toronto in January next. About six millions of this will be used for the Scarboro water supply, two and a quarter millions for the Bloor street viaduct, and one million each for garbage disposal and storm sewers.

Mr. Thos. W. Wilby who recently toured the continent in an automobile, for the purpose of selecting the route for the coast-to-coast highway planned by the Canadian Highway Association, has made several suggestions to the Dominion Government at Ottawa in an effort to obtain their aid for the proposed work.

Assessment Commissioner Forman has reported to the Civic Works Committee of Toronto that it would cost approximately $1,000,000 to extend Temperance street from Bay to Simcoe streets, at a width of 66 feet. The suggested improvement was not a necessity and he therefore strongly recommended against it.

It has been finally decided to build the civic abattoir at Toronto, on Tecumseh street. The main building is a square block measuring 187 x 187 feet. A separate building has one section, 64 x 48 feet, for ice machinery, another 64 x 48 for boiler and engines and a third 96 x 96 feet for the rendering plant.

Building permits in Calgary for October amount to $1,595,490, an increase of nearly $800,000 over the corresponding month of last year. It is expected that the permits for the whole year will reach $20,000,000, the figures for the first ten months being $17,456,000. Calgarians claim that no other city of 75,000 inhabitants can equal this record.

Mr. Wilfrid Duquette, contractor, of Montreal, who built a tunnel under the C. P. R. tracks, at St. Lawrence street, has entered action against the city of Montreal for $51,217.58, this amount being claimed as an alleged balance due on his contract, as well as his deposit of $15,000 placed in the treasury of Ville St. Louis before annexation to the city.

Building continues to boom in Montreal. For the month of October the permits totalled 353 of the value of $2,846,-

508, a gain of $1,186,553 on the corresponding month of last year. For the year the total was $16,171,902, an increase of $3,092,737 as compared with the ten months of 1911. Counting the building in the new wards, harbor, and for the municipality the total is over $26,000,000.

It is expected that Vancouver will see a new record set in rapid construction when the erection of a six-storey hotel on Pender street, near the corner of Richards, is started. The building will be of mill construction and will cost about $75,000. It is the intention of the owners to have it ready for occupation within two months of the time that operations start. This will necessitate day and night work.

The drydock, "The Duke of Connaught," constructed by Vickers, Ltd., for Montreal, is now berthed at Maisonneuve. The vessel had a very tempestuous voyage, five times breaking away from the tugs. It was with great difficulty that she was conveyed up the St. Lawrence, and even within three miles of Maisonneuve had to be guarded by four tugs owing to the stormy weather. The drydock is a notable acquisition to the port's facilities.

After lengthy negotiations in regard to detail, an agreement has been arrived at between the city of Moose Jaw and the Grand Trunk Pacific Railway on the subject of the latter's entry into the city, which will now be made on the original road allowance. Steel is at present only nine miles out and grading is completed to within half a mile of the city limits, so that if labor conditions improve there is a possibility of the tracks entering the city this year.

In a recent address before the British Columbia Conservative Association held at Revelstoke, Sir Richard McBride, the Provincial Premier, made the announcement that the government had surveyed 1,000,000 acres along the line of the Grand Trunk Pacific Railway in British Columbia for the sole use of pre-emptors, and that by the end of 1913 it would be prepared to offer 160 acres each to 30,000 bona fide settlers on pre-emptions.

At Fort William, Ont., excellent progress is being made in the construction of the Superior Brick Company's plant. Ninety men are now employed and it is hoped to have the plant in operation by May 1, 1913. The Superior Brick Company was incorporated quite recently with a capital of $500,000. The president is Mr. A. A. Ayer, of Montreal; the vice-president, Mr. G. F. Stephens, Winnipeg, and the secretary-treasurer, Mr. G. R. Duncan, of Fort William

According to advices from Brandon, Captain Munn, a well known explorer who has been visiting friends in that city, has left for a trip to the Peace River country for a syndicate of wealthy British capitalists who propose to purchase large tracts of land for colonization purposes in that section of the west. Capt Munn is travelling over the Grand Trunk Pacific as far as Edson, Alta, from where he will cover the 170 miles to the Peace River by pack horse.

Now that the Quebec Public Utilities Commission have given provisional approval of the plans of the Montreal Electric Service Commission for placing all wires underground in St. Catherine street, subject to the adjustment of final details, the Electric Commission have suggested to the Council that, in event of a construction engineer being appointed, he should be under the jurisdiction of the Commission Mr. Walter Jones, the engineer who was responsible for the plans, has resigned and returned to New York

The total value of the permits issued to date at Regina, Sask., is $5,565,961, as compared with $1,943,110 for the corresponding period of 1911 Last month showed a slight decrease as compared with October, 1911, the figures being respectively $411,275 and $674,740. The falling off is attributed to the bricklayers' strike which occurred at the beginning of the month. The figures are furnished by Mr. O. T. Falls, Building Inspector, who states that a number of large permits which are to be taken out this month will probably establish a record.

The Foundation Company, Limited, Bank of Ottawa Building, Montreal, have been awarded the contract for the construction of the sub-structure of a bridge from Goat Island to Manitoulin Island, near Little Current, Ont. The work, which is being done for the Algoma Eastern Railway Company, will consist of four piers and two abutments, all carried down to bed rock. Work has commenced and will be carried on throughout the winter months, with the expectation that the sub-structure will be completed and ready for the erection of steel in the early spring.

The Montreal Board of Control have been requested by the Council to report on a resolution by the Canadian Fire Underwriters' Association arising out of the partial breakdown of the water service. The resolution alleged faulty construction and workmanship, the acceptance and use of inferior material, continued dilatoriness and repeated disasters, apparently proceeding from incompetent management on the part of the Engineering and Waterworks Department of the city, and asked that a commission of three experts should make an investigation into the whole conduct and management of the Waterworks Department.

After being hung up for several weeks, the Montreal City Council have decided to give a contract to the Warner Quinlan Asphalt Company for the paving of five streets with asphaltic concrete. Originally another material was recommended by the controllers, but as there was a difference of about $8,000 in the tenders, the council decided to accept the lower bid. The Warner Quinlan Company have a plant at St. Henri, Montreal, and have carried out contracts for laying Mexican sheet asphalt for Montreal, Westmount and St. Lambert, and have also put down scoria blocks for Westmount, and mastic sidewalks for Montreal.

The revision of the Municipal Act, which has been under way since last session, is to be put in its final form before the Ontario Legislature in the coming session. An important change is one providing that the soil and freehold of every highway shall be vested in the municipality having jurisdiction over it, and every municipality is to have such jurisdiction over its highways unless conferred in another council. Changes in annexation regulations or expropriation powers have also been made. The question as to what constitutes a ratepayer is decided by calling him "elector." The power of expropriation is included in the power to acquire land granted corporations

The latest addition to the new coal producing areas of Western Canada is that of the Security Coal Mines Company, Limited, whose property is situated forty miles west of Edmonton and within three quarters of a mile of the Grand Trunk Pacific station at Wabamun It is anticipated that steel will be laid and shipment begun within the next thirty days. The mine, which has been under development for three years, consists of three seams out cropping on a terrace from which the coal can be screened and loaded by gravitation That now being worked varies from 15 to 20 feet in thickness The entire contents of the three are estimated by experts at 32,000,000 tons The coal is of the semi bituminous variety and has been shown, both by analysis in the Provincial Government laboratory and by actual test to be of first class quality suitable for steam purposes and for domestic use It will be mined by coal cutting machinery operated by compressed air It is anticipated that an output commencing at one hundred tons and increasing to one thousand tons a day will be easily obtained

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Berlin, Ont.

Trunk sewer. Mayor, W. H. Schmalz. Clerk, A. H. Millar. Plans and estimates will be prepared at once, and submitted to the Provincial Health Officer for his approval.

Dunnville, Ont.

Chairman Water Commission B. L. Edgecombe will receive tenders until Nov. 18th for turbine for domestic and fire protection purposes. Supt., A. M. Jackson.

Kenora, Ont.

Sewer system and sewage disposal plant. Plans in progress. Clerk, M. McCulloch. Con. Engr., T. Aird Murray, Lumsden Bldg., Toronto.

Montreal, Que.

Pumping plant to cost $32,000, Youville Square. Structural engineer, Geo. Janin, Chief Engineer. 1-sty., 50 x 75, stone foundation, brick and structural steel construction. Plans drawn.

Rosthern, Sask.

Sidewalks to cost $10,000. By-law passed authorizing the work. Mayor, H. W. Wetherby. Clerk, Geo. Braden.

Sandwich, Ont.

Paving—Plans and estimates prepared and work will start as soon as possible in the spring. Full particulars from clerk, E. R. North, Bedford street between Windsor and Sandwich east.

Simcoe, Ont.

Street improvements. Town Council contemplates laying a number of granolithic walks and making improvements to streets shortly. Clerk, W. C. McCall.

Toronto, Ont.

Water main to cost $230,000; 36-in. cast iron pipe (from College to Reservoir). Mayor, H. C. Hocken. Work under consideration.

Varna, Stanley Twp., Ont.

Drainage. Clerk, Robt. J. Richardson. Work estimated to include 30,500 cu. yds. Tenders received by clerk until Nov. 29th.

Wadena, Sask.

Street improvements to cost $25,000 are under the consideration of the town council. Sec.-treas., F. M. Mugan.

CONTRACTS AWARDED

Brampton, Ont.

Concrete pavement, cement, crushed stone, tile, manholes and gravel required. Clerk, W. H. McFadden. Town engineer, W. Treadgold. General contractors, Curran & Clement, Orillia, Ont.

Hamilton, Ont.

Water mains on Catharine, Glendale, Henry, Avondale, Fairleigh, Woodleigh, Roxboro, Burlington, Sherman, and 12-in. connection under G. T. R. tracks at Trolley. Mayor, Geo. H. Hees. Engineer, A. F. Macallum. Work is being done by day labor.

Medicine Hat, Alta.

Sewerage pumping station to cost $5,000, Balmoral street. Clerk, H. Baker. Engineer, A. K. Grimmer. General contractors, Hotson & Leader, Main street. Contract for pumps let Canadian General Electric Co.

Winnipeg, Man.

Sewers, 500 lin. ft. of 9-in. pipe, for Rural Municipality of Kildonan. Secretary-treasurer, Harry Thompson, 215 Chambers of Commerce, Winnipeg. General contractor, The Dominion Construction Co., 290 Selkirk avenue, Winnipeg.

Conduit pipes. Engineer, J. G. Glassco, 54 King street. General contractors, Wood & Vallance Ltd., McDermot and Arthur streets, Winnipeg, for 4000 lin. ft. 3-in. and 2½-in. pipe and 100 pieces bends each 3 in. and 2½ in., 90 deg. 2-in. radius. Board of Control. Secretary, M. Peterson.

Local improvements. The Dominion Construction Co., 290 Selkirk ave., was awarded the contracts for sewers in Wilton street and Ida ave. J. W. Astley, Engineer of Construction, City Yards, was awarded contracts for sewer in Strathcona street, also for granolithic walk on Rachel, Mountain and Aberdeen aves., and water mains on Spruce, Wall, Ellice, Richard, Wolseley, Livinie, Sargent, St. James, Ashburn, Pembina, Crescent, Artillery, Manhattan, Sherburn, Richard, Riddle, Sargent, Strathcona, Bartlett, Clare, Winnipeg, Flint and across Assiniboine River at River ave., Arlington and Mitchell streets.

Railroads, Bridges and Wharves

Calgary, Alta.

C. P. R. Co. have been authorized to construct spur for the Ontario Wind & Engine Pump Co.

Improvements to street railway, cost $450,000. It was agreed between the Engineer and Mayor Mitchell that the Municipal Street Railway would improve the system next year, $221,000 to be spent for rolling stock, $150,000 for track extensions and $79,000 for car barns.

Clarendon, Que.

C. N. O. Ry. Company's location and lay of station at Clarendon Co., Pontiac, Que., has been approved.

Twp. Clarke, Ont., Co. Durham

C:L.O. & W. Rly. (C. P. Rly.) Company have been authorized to construct bridge across highway at mileage 141.27, Township of Clarke.

Comox, B.C.

The Esquimalt & Nanaimo Railway Co. have been authorized to construct bridge No. 85 over Little Qualicum River on its Comox extension.

Fort William, Ont.

Subway. C. P. Ry. Co. have been directed to construct spur from main line east of Neebing avenue to a point 100 ft. south of C.N.R. passing under C.P.R. by means of subway and directing C. N. R. to raise its railway 13 ft. to carry it over Neebing avenue and the proposed branch line and constructing temporary structure across Neebing avenue.

Lachine, Que.

C. P. Ry. Co. have been authorized to construct spur line for the St. Lawrence Bridge Co. Ltd., on Lot Cadastral No. 915, Parish Lachine, Co. Jacques Cartier, Que.

London, Ont.

Electric railway to cost $890,000. Con. engineer, S. B. Storer, Syracuse, N. Y. Hon. Adam Beck has presented proposition recommending the adoption of an overhead trolley system and double-tracking of the London & Port Stanley Railway.

Lucknow, Ont.

Bridges to cost $3,800; cement and steel construction. By-law passed. Town clerk, Joseph Agnew. Plans will be prepared shortly. Work to start in the Spring.

Montreal, Que., Cartierville

Bridge. C. N. O. Ry. Co. have been authorized to construct across tracks of the Montreal Tramways Co. by means of overhead structure.

Bridge. C. N. O. Ry. Company have been authorized to construct across Sault au Recollect Rd. by means of overhead crossing.

Moose Jaw, Sask.

Branch railway. G. T. P. Branch Lines Company's location of Moose Jaw Northwest Branch from mileage 48.55 to 67.86 has been approved.

Prince Albert, Sask.

A line of C. N. Ry. is contemplated being constructed from Prince Albert through the Carrot River Valley to the Pas Mission and thence to Hudson Bay.

Port Arthur, Ont.

Extensions contemplated to Port Arthur & Ft. William Electric Railway Co. General manager and Pur, Agt., N. C. Pitcher, Port Arthur. Plans in progress.

Shelburne, Ont.

C. P. Ry. Company's location of station at Sherburne has been approved, and plans will be prepared.

St. Louis, Que.

C. P. Ry. Co. have been authorized to construct spur for D. Lalonde on lots Cadestral No. 328 in the village of St. Louis, Parish Montreal, Que., now in city of Montreal at Mile End Station.

St. Stephen, N.B.
Pier, on St. Croix River, for Dominion Fertilizer Co. Solicitor, M. Marks Mitchell. It has been decided to postpone building of wharf until spring, and the call for tenders has been withdrawn until later in the winter.

South Hazelton, B.C.
The G. T. P. Ry. Co. will build station in conformity with instructions issued by the Board of Railway Commissioners.

Strathmore, Alta.
C. P. Ry. Co. have been authorized to construct spur into the premises of the Department of Natural Resources for the C. P. R. on west half of section 14, twp. R 25 W 4 M.

Trenton, Ont.
C. L. O. & W. Ry. (C. P. Ry.) Company have been authorized to construct bridge across Marmora street.

Twp. Tyendinega, Ont.
Branch railway. C. L. O. & W. Ry. (C. P. R.) Co. have been authorized to construct railway from mileage 59.45 to 65.75 in Twp. Tyendinega.

Winnipeg, Man.
C. P. Ry. Co. have been authorized to construct spur for the Anthes Foundry Co.

CONTRACTS AWARDED

Seaforth, N.S.
Breakwater, cost $17,300, Dominion Government. Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. General contractors, Halifax Dredging Co., Ltd., Halifax, N.S.

Public Building, Churches, Schools, etc.

Brewer's Mills, N.B.
Church for Anglican Church Congregation. Pastor, Rev. G. T. Spriggs, Zealand Station, N.B. Plans in progress.

Chatham, Ont.
Laundry building planned for the Hospital Board. Chairman, Michael Houston. Tenders will be called in the spring. Information received in regard to latest equipment.

Fernie, B.C.
Drill Hall, Dominion Government. Dept. of Militia & Defence. Secretary, Col. Eug. Fiset, Ottawa. Plans, specifications, etc., from officer commanding Military District No. 11, Victoria, City Clerk at Fernie or Director of Engineer Service, Ottawa. Tenders received by Secretary until noon, November 21, 1912.

Hamilton, Ont.
Addition to St. Ann's School to cost $20,000. Chairman Separate School Bd., J. A. Reding, Commercial Chambers, James street. Architect, L. A. Wardell, Bay and Hunter streets. Pressed brick, slate roofing. Plans in progress.

Kingsville, Ont.
Library. Clerk, Geo. Pearse. Architects, Crane & Pennington, Bong Bldg., Windsor. 1 sty and basement, brick and stone, slate roofing. Plans prepared.

Pavillion to cost $3,000. Clerk, Geo. Pearse. Architects, Crane & Pennington, Bong Bldg., Windsor. Work will not start until spring. 1 sty., 80 x 40, stone foundation, stone and cement construction. Plans in progress.

London, Ont.
Jas. C. Duffield, Hon. C. S. Hyman and others have purchased the American Estate and will remodel building for club house. Further information from Jas. C. Duffield, City Gas Co., 213 Dundas street. Heating system, gas and electric lighting, complete club furnishings required.

Montreal, Que.
The Centerfreeze Sanitary Ice Co. Ltd. plan to instal an artificial ice plant at Stellside and Metcalf avenues.

Church to cost $50,000 for Stanley St. Presbyterian Church Congregation, Montreal. Pastor, Rev. W. D. Reid, 99 Stanley street, Montreal. Plans in progress.

North Battleford, Sask.
The city council contemplates erecting a General Hospital. Clerk, H. C. Adams.

Regina, Sask.
Fire Hall, cost $16,000, including furniture, fire alarm gong and equipment and sundries. Above was passed by committee and Fire Chief and work will be commenced shortly. Clerk, A. W. Pool.

School to cost $100,000, Blk. 53, Broders Annex. Sec., J. H. Cunningham. Architect, J. H. Puntin, McKenzie-Brown Blk., Scarth street. 20 rooms, fireproof construction, modern in every detail. Excavation will start immediately. Contracts not yet awarded.

St. Andrews, N.B.
Amusement hall for Canadian Pacific Railway, head office Montreal. Hotel Supt., Hayter Reid. 2-sty., open balconies. Plans under consideration.

St. John, N.B.
Infirmary for Catholic Diocese Sisters of Charity. Bishop Casey, Waterloo street, St. John. Architect, F. Neil Brodie, 42 Princess street. Plans in progress.

Sunday School building for Germain Street United Baptist Church, c/o Supt. Donaldson Hunt of Henderson & Hunt, Charlotte street. Concrete foundation, brick construction. Plans in progress.

St. Thomas, Ont.
Enlarging barracks, cost $5,000, for Salvation Army. Architect, Major Miller, Salvation Army Barracks, Toronto. Hot water heating system to be installed. Plans in progress.

Stoughton, Sask.
Skating and curling rink, cost $4,500. Plans ready and work will start as soon as necessary arrangements are made. Secretary treasurer, D. S. Lloyd.

Sussex, N.B.
Agriculture College contemplated by the Provincial Govt. Sec., H. F. McLeod, Fredericton. Premier, Hon. J. K. Flemming, Fredericton. Plans will be prepared.

Three Rivers, Que.
Sanitarium for Dr. C. N. DeBlois. 1 sty., concrete foundation, stone and brick construction. Plans in progress.

Public Building. Tenders received by Sec., R. C. Desrochers, Ottawa, Dom. Govt. Dept. of Public Works, until Nov. 25th. Plans, specifications, etc., at office of Chas. Lalond, architect, Three Rivers, Que.; R. L. Deschamps, 103 St. Francois Xavier street, Montreal, and Dept., Ottawa, and MacLean Daily Reports, Toronto. See advertisement in "Tenders & For Sale Dept." of this issue.

Toronto, Ont.
Mission Halls planned for Baptist Mission Board, c/o Rev. W. E. Norton, 625 Confederation Life Bldg., who are spending $13,000 in purchasing sites throughout the city.

Picture theatre and lodge rooms to cost $15,000 for Merven Lancaster, 186 Dundas street. Architect, P. H. Finney, 79 Adelaide street E. 1-sty., stone foundation, brick construction. Plans have been prepared.

Vancouver, B.C.
Schools. Sec., C. W. Murray. The Board will likely have a by-law submitted for $75,000 to purchase school sites and if it is passed, steps will be taken towards building as soon as possible.

Customs Examining Warehouse, Cordova street. Dom. Govt. Dept. of Pub. Works. Sec., R. C. Desrochers, Ottawa. Architect, Wm. Henderson, Public Wks. Dept., Victoria. General contractor, J. G. McDiarmid. Tenders received by secretary until Nov. 18th for electric elevators. Plans at office of E. E. McGregor, Clerk of Works, Vancouver Examining Warehouse. H. E. Matthews, Supervising architect, Winnipeg, Man.; Dept. Ottawa, and MacLean Daily Reports, Toronto.

Wallaceburg, Ont.
Public building. Tenders received by secretary R. C. Desrochers, Ottawa, Dom. Govt. Dept. of Public Works, until Nov. 20, 1912. Plans at office of postmaster, London, Ont., and Wallaceburg.

Winnipeg, Man.
Weigh scales building at Incinerator in City Yards, Ward 7. Plans, specifications, etc., at engineer's office. Tenders received by secretary until November 14. Board of Control, Secretary, M. Peterson. Engineer, H. N. Ruttan, 223 James ave.

Woodstock, N.B.
Agricultural College to cost $75,000, for Estate of L. P. Fisher. Plans in progress.

CONTRACTS AWARDED

Brandon, Man.
Fraternal Hall to cost $4,500, 6th St. Architect and general contractor, J. E. Blackwell, 457 Russell street. 1 sty., 36 x 100, cement foundation, cement block construction.

Brampton, Ont.
Theatre for Architect Giffen. Mason, Henry Hill. Carpenter, Robert Hall. 100 x 50, cement foundation, brick construction. Excavation finished.

Chilliwack, B.C.
Armory, cost $22,000. Dominion Government, Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. General contractors, Campbell & Wilkie, 613 Pender street west, Vancouver. Brick and concrete construction, steel roof trusses. General contractors will receive tenders for the brick work, steel, galvanized iron, concrete work and painting.

Hanley, Sask.

Town Hall to cost $25,000. Clerk, A. Holm. Architect, Thomson & Crockart, Saskatoon. General contractor, Duncan & Black, Saskatoon. 2-sty., 70 x 60, brick, cement foundation.

Harriston, Ont.

Church (alterations) to cost $6,000. Architect and general contractor, Frank Leppington. Pastor, Mr. Martin. 2-sty., cement foundation.

Limoion, Que.

Hospital to cost $25,000 for Nuns of St Francis. Architects, Talbot & Dionne, Que. General contractors, Jinchereau & Lamonde, Que. Iron and steel, Eastern Canada Steel & Iron Works, 508 Coristine Bldg., Montreal. Roofing, Nap Barbeau, Que. Ptg., Gauthier & Frere, Que. Heating, plumbing and electric work, A. Picard Fils, Que. 4-sty., 130 x 40, and wing 90 ft.; stone foundation, scotch brick and structural steel construction.

Medicine Hat, Alta.

Theatre and apartment to cost $50,000, Ottawa street, for Penland & Babb, general contractors. Architect, Wm. T. Williams, Main street. 3-sty., 33 x 130, stone and brick construction, cement foundation. Excavation started.

Montreal, Que.

Dance hall to cost $7,000, 835 St. Dominique, for M. Levitt, 56 St. Lawrence. Dufort & Decary, 25 La Patrie Bldg. General contractor, J. Steinberg, 56 St. Lawrence. 1-sty., 55 x 42, brick, structural steel.

Moving picture theatre to cost $15,000, Ontario and Hogan streets. Owner and general contractor, Jno. Hoolahan, 119 Sir G. E. Cartier Sq. Architect, Rene Charbonneau, 15 St. James street. 2-sty., 50 x 80, cement foundation, brick and structural steel construction.

Moving picture theatre, cost $18,000, Mance and Laurier, for Stuarts Limited, Laurier ave. Architect, D. J. Creighton, Jacobs Bldg. General contractors, Corbeil Freres, 192 Clarke. Two storeys, 52 x 97, brick, terra cotta, reinforced concrete, stone foundation.

Gymnasium, cost $11,000, for Mission Evangelique St. Jean Baptiste, 128 De la Roche. Architects, Hutchison, Wood & Miller, Royal Insurance Bldg. General contractors, Grosvalet & Lefebore, 247 Hotel de Ville ave. Two storeys, 43 x 44, cement foundation, brick construction.

Regina, Sask.

Normal School to cost $250,000, 16th avenue. Prov. Govt., Dept. of Public Works. Acting Deputy Minister, H. S. Carpenter. Architect, Storey & Van Egmond, Northern Bk. Bldg. General contractors, The Parson Construction Co. Heating, The Regina Plmg. Co., 3-sty., red pressed brick construction faced with Bedford stone; steam heating, electric lighting. Only basement will be completed this fall.

St. Thomas, Ont.

Zoo and greenhouse. Clerk, W. B. Doherty. Architect, J. T. Findlay, 396 Talbot street. Mason, F. L. Little. Carpenter, D. L. Shafer. Painting and glazing, E. B. Dixon, 175 Talbot street.

Vernon, B.C.

Hall to cost $3,950 for St. Andrews Church. Architects, Branch & Coxall, General contractor, H. G. Ogilvie. 1-sty., 30 x 50, cement foundation, frame construction.

Windsor, Ont.

Addition to armories to cost $30,000. Dom. Govt. Dept. of Militia & Defense. Sec., E. F. Jarvis, Ottawa. 2-sty. and basement, brick construction. Plans in progress.

Winnipeg, Man.

Law courts to cost $100,000, Kennedy and Broadway. Prov. Govt. Prov. architect, V. W. Horwood. Structural engineer, C. A. Turner, Canada Building. General contractors, The National Construction Co., Donalda Blk. 4-sty., 260 x 230.

Moving picture theatre to cost $15,000, for N. T. MacMillan. Architect, Jno. D. Atchison & Co., Trust & Loan Bldg. General contractor, W. Moxam, Spadina and Joseph streets. 2-sty., 51 x 99, concrete foundation, brick construction. Excavation done.

Business Buildings and Industrial Plants

Cap de la Madeleine, Que.

Factory planned for Union Bag & Paper Co., Montreal. Further particulars from secretary-treasurer of Municipality.

Edmonton, Alta.

Warehouse planned for the Fairbanks-Morse Co., Chicago, Ill. Chas. H. Morse and W. E. Miller are in Edmonton to secure suitable site.

Office building to cost $250,000 planned for Allan, Killam & McKay, 364 Main street, Winnipeg. President, Wm. R. Allan. 6-sty., fireproof construction. To be built in 1913.

Galt, Ont.

Addition to factory planned for Galt Shoe Manufacturing Co. Ratepayers have voted favorably on by-law to loan $15,000 to above company for the enlargement of their present factory.

Hamilton, Ont.

Addition to Revere Hotel for Staunton Bros., 137 King street E. Architect, A. W. Peene, 2 King street W. 3-sty., addition, 25 bedrooms. Plans being prepared but work will not commence until next spring.

Alterations to building, cost $6,000, for Lister Estate. Architects, Watt & Blackwell, Lister Bldg. Roof raised and top flat made into offices, fixtures required, window glass, painting, etc. Plans in progress.

London, Ont.

Storage building, Bathurst street, for Bell Telephone Co., 431 Park avenue. Mgr., W. H. Beard. Brick construction. Plans prepared.

Addition to cigar factory for Caste Cigar Co., King street. Manager, Jose Caste. Two storeys, 80 x 40, brick construction. Plans to be prepared.

Addition to plant planned for the George White Co., mfrs. threshing engines. New buildings to be erected next spring and additional machinery installed.

Auto factory (alterations). W. Henry, Chicago, Ill., is taking over plant of London Foundry Co. and will manufacture the Mitchell auto in London. Plans to be prepared later for important extensions. Further information from D. Cowan, manager, London.

Marysville, York Co., N.B.

Remodelling hotel for Canadian Cottons Ltd. Mgr., C. H. Hatt. Interior of hotel to be remodelled; steam heating and bathrooms to be installed. Plans in progress.

Medicine Hat, Alta.

Extension to brick plant. Warren Overpack has purchased the Purmal Brick Company's plant and will greatly increase its capacity by extending and installing new machinery. Capacity per day when completed 100,000 bricks as well as hollow ware and tile.

Montreal, Que.

Store and office building, 556-560 St. Catherine W., for J. Birchenough, 208 Merchants Bank Bldg. 10-sty., 108 x 76. Plans in progress.

Office building. Jos. Versailles, Banque Nationale Bldg., has purchased the "Plaza" block on St. James street and will erect 10-sty. office building.

Stores to cost $18,000, for M. Lavut & Son, 564 St. Lawrence Blvd. Architect, C. Chausse, 1975 Park avenue. Cement foundation, brick and structural steel construction. Tenders called.

Moose Jaw, Sask.

Business block planned for the Northern Crown Bank. A site has been purchased on the corner of Main and River streets, 54 x 125, on which a large block will be built next spring.

Mowat, Ont.

Saw mill planned for W. J. Palmer, Brussels, Ont. Complete new machinery and general equipment required.

New Hamburg, Ont.

Factory, cost $70,000, for The Silversmiths Co., Ltd. Tenders received by Architect, J. H. Mickler, Preston, Ont. Two storeys, 130 x 40, mill construction. Machinery required.

Ottawa, Ont.

Bank building planned for Merchants Bank of Canada, head office Montreal. 8-sty. Plans in progress.

Motor tractor factory is planned for Martin Tractor Co., Indianapolis, Ind., who will manufacture motor tractors, garbage wagons, etc.

Preston, Ont.

Factory planned for Ancher Mfg. Co. Address, Mr. H. C. Edger, Preston, for full particulars. Ratepayers will vote on by-law Nov. 18th to loan above company $25,000.

Regina, Sask.

Warehouse to cost $15,000, for The Garden City Feeder Co. Company has been granted lot 8, block 137 as a site and plans will be prepared.

Flour mill and elevator contemplated for the Regina Flour Mill Co.; capacity 2000 bbls. per day. The city has agreed to provide land and give fixed assessments, etc. Plans will be prapared.

Stores and apartments, cost $35,000, for N. L. Armstrong. Architect, R. Allan. Three storeys, 52 x 100, pressed brick front. Plans prepared. Excavation to start at once. Work to be completed by spring.

Rivers, Man.

Hotel to cost $30,000 planned for N. Nicholson, Clarendon Hotel, Winnipeg.

51 rooms. Site already purchased but work will not start till spring.

Saskatoon, Sask.

Dairy lunch room to cost $15,000 for The Canada Catering Co., Winnipeg, c/o Architect, J. N. Semmens, 903 MacArthur Building. One storey, 28 x 115, white tiled inside, kitchen fittings required. Tenders received by owner for various trades, etc.

Stores and apartments to cost $20,000, Main street and Victoria avenue, for Mr. Innes, 413 25th street E. Architects, Thompson & Crockart, Masonic Temple. Only excavating contract awarded. Other contracts will not be let till spring 1913. Communicate with architects or owners.

St. John, N.B.

Extension to factory (Courtenay Bay), for Cornwall & York Cotton Mills Co., Wall street. Manager, J. B. Cudlip. 60 x 22, brick construction; machinery required. Plans in progress.

Stratford, Ont.

Remodelling shoe store, McCrimmon Block, for The John Agnew Co., 37 King street, Berlin. Plans in progress.

Sudbury, Ont.

Bank building, Durham street, for Bank of Ottawa. Mason, W. Tanner. Tenders received by owner. Two stys.

Three Rivers, Que.

Manufacturing plant planned for General Chemical Products & Explosives Co. Address Mgr. c/o company for further information.

Tilbury, Ont.

Grist and flour mill for Samuel Mather. Ratepayers have passed by-law granting loan of $2,000 to assist in rebuilding mill that was burned.

Toronto, Ont.

Store, 1708 Dundas street, for E. W. Ball, Weston P. O. 2-sty., stone foundation, brick construction. Plans drawn.

Addition to store for W. K. Murphy, 479 Queen W. Architect, J. H. Stanford, Bloor and Ossington avenue. Brick. Tenders received by owner.

Store (alterations), Dundas and Argyle streets, for Trust & Guarantee Co., per Hugh Finn Estate. Mgr., J. J. Warren, 46 King street W. Plans drawn.

Garage to cost $7,000, Jarvis street, for Deeth & Sons, 44 Grove avenue. Architecs, Redmond & Beggs, Kent Bldg. Brick, structural steel, cement piers. Plans drawn.

2 stores and flats to cost $6,000 for Dr. W. L. Bond, Yonge street, Eglinton. Tenders received by architect, Leu Foulds, 21 Leader Lane. Brick construction and foundation.

Bank building, 2 storeys, for Metropolitan Bank. Tenders received by architects, Darling & Pearson, 2 Leader Lane, until Nov. 16th. Plans, specifications, etc., at their office.

2 stores to cost $5,000, N.E. corner Logan and Withrow avenue, for T. Taggart, 138 Riverdale avenue. Architect, P. H. Finney, 79 Adelaide E. 2-sty., brick foundation, brick construction. Plans in progress.

2 stores and residence to cost $10,000, E. S. Roncesvalles avenue, for A. E. Cornelius, 50 Walker avenue. Tenders received by architect J. H. Galloway, 23 Toronto street. 3-sty., stone foundation, brick construction.

Vancouver, B.C.

Warehouse, cost $75,000, Bridge and Beattie streets, for J. W. Gibb, 1273 Nelson street. Architects, Parr MacKenzie & Day, Vancouver Bldg. Five storeys, mill construction. Tenders called.

Store and apartments to cost $40,000, 143 Powell street. Owner and general contractor, E. J. Ryan, 768 Granville St. Architect, W. F. Gardiner, 347 Pender street W. 3-sty., brick and mill construction. General contractor will sublet plumbing, heating, painting, plastering, mill brick work, sheet metal and roofing.

Windsor, Ont.

2-storey addition to business block, Oullette avenue, for Gordon McGregor, Walkerville. Plans in progress.

Business block planned, Chatham St., for a Syndicate. John Duck, 221 Ouellette ave. and Don McGregor are interested. Address Mr. Duck for further information.

Business block, Ouellette and Sandwich, for Dr. A. Soper, Manning House; bank, stores and offices. 6-sty., brick and steel construction, enamelled brick front. Plans to be prepared.

Winnipeg, Man.

Creamery, cost $8,000, Main street W., for The City Creamery Co. Interested, J. A. Macpherson, c/o Manitoba Frost Wire Fence Co., Sherbrooke street and Logan ave. W. Plans are being prepared and building will be erected this fall.

CONTRACTS AWARDED

Brantford, Ont.

Stables to cost $2,900 for Jno. T. Burrows. Builders, P. H. Secord & Sons, Ltd. 1¾-sty., 36 x 92, cement foundation, reinforced concrete construction.

Store and residence for Andrew Young, 782 Dalhousie. Builders Ingleby, Fitness & Taylor, 116 Brant street. Two storeys, 24 x 16, cement foundation, pressed brick construction.

Calgary, Alta.

Brickworks to cost $5,000, for Konnick System Sandstone Brick Co. Builders and general contractors, Nesbitt & Miller, Edmonton. 1 and 2-sty., 110 x 118.

Stores and rooms to cost $7,000, New Edenboro, for Colpett & Dawson. Builder and general contractor, O. E. Kemnidge, 202 5th street N.W. 2-sty., 30 x 60, brick, cement foundation.

Stores to cost $5,000, for E. & G. Cooke, Blackburn, England. Architects and builders, J. Smalley & Co., 131 8th avenue W. 1-sty., 50 x 50, brick, cement foundation.

Coquitlam, B.C.

Plant for the Coquitlam Ship-building Co. Pres., L. D. Shafner. General contractors, The Fraser River Pile Driving Co., New Westminster, B.C. Machinery, The Pacific Machinery Co., Vancouver, B.C. Saw mill which is one unit of plant now under construction, capacity, 30,000 ft. per day.

Farnham, Que.

Tobacco experimental station. Secretary, A. L. Jarvis, Ottawa. General contractor, S. A. Matte, 606 St. Patrick St., Ottawa.

Galt, Ont.

Addition to factory, Water street N., for Galt Robe Co. Mason, Thomas & Hancock. Carpentery, Hamill Bros. 2 storeys, 100 x 75, brick construction. Foundations in.

Guelph, Ont.

Foundry for International Malleable Iron Works. Architect, W. A. Mahoney. Mason, W. E. Taylor. Carpenter, Geo. Ibbiston. Foundations in.

Offices and warehouse, South Wyndham street, for Guelph Light, Heat & Power Commission. Architect, W. A. Mahoney, Douglas street. Mason, Johnston & William. Other work is being done by day labor. Plastering not let. Two storeys, 81 x 31 ft. 6 in., stone foundation, brick construction.

Hamilton, Ont.

Extension to factory to cost $5,000. Owners and general contractors, Hamilton Bridge Works Co., Bay street N. 90 x 54, steel and corrugated iron.

Medicine Hat, Alta.

Green house to cost $15,000, for M. Uberheine. Architects and builders, Crossley Bros. 1-sty., 28 175, frame and glass and galvanized iron; cement block foundation. Excavation started.

Addition to building to cost $30,000 for Canadian Bank of Commerce. Architects and builders, The Dominion Realty Co., King and Jordan streets, Toronto. 2½-sty., 29 x 49, brick and Calgary stone construction.

Montreal, Que.

Store and residence to cost $4,800, Laurier avenue. Owner and builder, Est. J. O. Villeneuve, 2599 St. Laiorance. 3-sty., 25 x 60, stone foundation, brick veneer construction.

Alteration to store and office to cost $10,000, for R. H. Bryson, 184 Peel. Architects, Nobbs & Hyde, 49 Beaver Hall Hill. General contractors, Bonnell Bros., 341 Guy. 2-sty., 40 x 23, cement foundation, brick construction.

Peterboro, Ont.

Factory to cost $65,000, Park and Lansdowne, for De Laval Dairy Supply Co. General contractors, Jno. W. Paterson Co., Paterson, N.J. 1-sty., 110 x 112, stone and concrete foundation, reinforced concrete, terra cotta, brick, structural steel construction. Tenders still open for roofing, ptg., also for 400 square feet 6-in. hollow wall blocks, terra cotta and 820 lin. ft. wall coping. W. J. Smith, engineer.

Quebec, Que.

Alterations to Canadian Bank of Commerce, cost $8,000, Head Office, Toronto, Ont. General contractor, A. Fackney, Quebec. Painting, Merchant Bros. 3 storeys.

Regina, Sask.

Warehouse to cost $6,000, St. John and 7th avenue, for Regina Trading Co. Pres., J. F. Bole, M.L.A. General contractors, Murphy & Martin.

6 stores and picture theatre for R. A. Carman. Architects, Brown & Vallance, 1006 McArthur Bldg., Winnipeg. General contractors, R. J. Lecky & Co., Northern Bank Bldg., Regina.

St. John, N.B.

Factory, Duke street, for Canada Brush Factory, 180 Brussell street, Prince William street. Architect, Garnet

(Continued on page 72)

Tenders and For Sale Department

Representatives Wanted

One of the largest firms in the United States manufacturing water meters desires to secure representatives in Eastern and Western Canada. Only firms or individuals having good connections with municipal authorities and town and city engineers are desired. Write giving particulars to Box 637, Contract Record & Engineering Review, Toronto. 45-47-76

Town of Humboldt
(Province of Saskatchewan)

Electric Lighting

Sealed tenders will be received by the Secretary-Treasurer until 8 p.m. on **Thursday, November 21st, 1912**, for the following works:

Contract "B"—Power House.
Contract "H"—Two Return Tubular Boilers.
Contract "J"—High Speed Steam Engine.
Contract "K"—Electric Lighting System.

Plans and specifications may be seen at the office of the engineers, Winnipeg and Toronto, and at the Town Hall, Humboldt.

C. W. ANDREASON, Esq., Mayor.
Humboldt, Sask.
W. H. STILES, Esq., Sec.-Treasurer,
Humboldt, Sask.
CHIPMAN & POWER, Engineers,
Toronto and Winnipeg.
45-46-80

Sealed tenders addressed to the undersigned and endorsed "Tender for Public Building, Wallaceburg, Ont.," will be received at this office until 4 p.m. on **Wednesday, November 20, 1912**, for the construction of a Public Building at Wallaceburg, Ont.

Plans, specifications and form of contract can be seen and forms of tender obtained at the Post Office, London, Ont., at the Post Office, Wallaceburg, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, October 30, 1912.

Newspapers will not be paid if this advertisement is inserted without the authority of the Department.—29081. 45-46-78

Water Commission
OF THE
Town of Dunnville, Ont.

Sealed proposals, addressed to B. L. Edgecombe, Esq., Chairman of the Water Commission for the Town of Dunnville, will be received up to 9 p.m. on **Monday, November 18th**, for a turbine pump installation for domestic and fire purposes.

All data to be obtained on application to the undersigned.

ALAN MAIR JACKSON, Superintendent,
45-46-83 P. O. Box 196, Dunnville, Ont.

Mail Contract

Sealed tenders addressed to the Postmaster General will be received at Ottawa until noon on **Friday, the 13th of December, 1912**, for the conveyance of His Majesty's Mails on a proposed Contract for four years, six round trips per week over Rural Mail Route from Kettleby, Ont., to commence at the pleasure of the Postmaster General.

Printed notices, containing further information as to conditions of proposed Contract may be seen and blank forms of tender may be obtained at the Post Offices of Kettleby, Glenville and at the office of the Post Office Inspector at Toronto.

Post Office Department, G. C. ANDERSON,
Mail Service Branch. Superintendent.
Ottawa, October 29th, 1912. 45-47-77

Sealed tenders addressed to the undersigned, and endorsed "Tender for Public Building, Three Rivers, P.Q.," will be received at this office until 4 p.m., on **Monday, November 25, 1912**, for the construction of Public Building at Three Rivers, P.Q.

Plans, specification and form of contract can be seen and forms of tender obtained at the offices of Mr. Chas. Lafond, Architect, Three Rivers, P.Q.; R. L. Deschamps, Esq., 103 St. Francois Xavier street, Montreal, and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, November 2, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—30298. 45-46-82

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

To Contractors

Tenders will be received by the undersigned up to twelve o'clock noon, **Tuesday, November 26th**, for demolishing the brick building and addition on the grounds of the Ontario Jockey Club known as Woodbine Park Hotel, Queen street east. Contractors are required to state the amount for demolishing the buildings, also allowance for taking and removing the material therefrom—all debris caused by the demolishing to be dumped in the excavated portion of the building. The lowest or any tender not necessarily accepted.

For further information apply to

The Secretary,
ONTARIO JOCKEY CLUB,
46-47-93 6 Leader Lane.

Sealed tenders addressed to the undersigned, and endorsed "Tender for Interior Fittings, Post Office, Peterborough, Ont.," will be received until 4 p.m., on **Wednesday, November 20, 1912**, for the work mentioned.

Tenders will not be considered unless made upon forms supplied by Department and in accordance with conditions contained therein.

Plans and specification to be seen on application to Mr. F. Bartlett, Architect, Peterborough, Ont., Mr. T. A. Hastings, Clerk of Works, Postal Station F, Toronto, and at the Department of Public Works, Ottawa.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, November 7, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—30039. 46-92

Debentures for Sale

The Corporation of the Town of Steelton will receive offers up to 8 o'clock p.m., **December 3rd, 1912**, for the purchase of the following debentures:

$7,000 Public School Debentures.

$9,000 for the purchase of property for park purposes.

$15,500 for the construction of a macadam pavement.

Full particulars on application to

J. ROBINSON,
46-48-91 Clerk, Steelton, Ont.

Mail Contract

Sealed tenders addressed to the Postmaster General, will be received at Ottawa until noon, on **Friday, the 20th of December, 1912**, for the conveyance of His Majesty's mails on a proposed contract for four years, six times per week, over Rural Mail Route from Newmarket, Ont., to commence at the Postmaster General's pleasure.

Printed notices, containing further information as to conditions of proposed contract may be seen and blank forms of tender may be obtained at the Post Office of Newmarket, Glenville, Holland Landing, and at the office of the Post Office Inspector at Toronto.

G. C. ANDERSON,
Superintendent.

Post Office Department,
Mail Service Branch,
Ottawa, November 4th, 1912. 46-48-88

For Sale

Ronald Steam Fire Engine for sale—capacity 500 gallons per minute; in first-class condition; only been used once at a fire, the most of the use being through practice; tenders will be received for the above up to Friday evening, 7 p.m. November 22, 1912.

T. B. CARLING, Clerk,
45-46-84 Exeter, Ont.

Agents Wanted

Large United States manufacturer desires to appoint agencies in Canadian territories, where not already represented, for the best line of Concrete Waterproofing coatings made. Attractive proposition. Box 621, Contract Record, Toronto, Ont. 42-53 T.F.

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St John 382, Winnipeg 11 t f

Bargain! Steel Channels

FOR SALE Below present market price, about 150 each of 4 in. 5¼ lb Steel Channels in the following lengths: 161½ in., 156 in., 30 3/16 in and 11⅝ in. Apply Purchasing Agent, The Canadian Rumely Co., Ltd., 18 Abell street, Toronto, Ont 46-94

Situations Vacant

WANTED—Draughtsman with structural and building experience who could make steel calculations. State salary. Prack & Perrine, Hamilton, Ont 46-47-89

WANTED Draughtsman able to make reinforced concrete drawings and calculations. State salary. Prack & Perrine, Hamilton, Ont. 46-47-90

Wanted—Town Engineer

for the Town of NEW GLASGOW, N. S.

Applications will be received by the undersigned, for the position of Town Engineer, from persons who must be fully qualified and competent to take charge of all branches of town work. Applicants will please state salary, give experience, particularly in permanent street building and in hydraulics, and furnish testimonials.

JOHN UNDERWOOD, Mayor.
46-47-95 JAMES ROY, Town Clerk.

Business Buildings and Industrial Plants

(Continued from page 69)

Wilson, Princess street. General contractor, Edward Farran, 234 City Road. Heating and plumbing, J. H. Doody, Prince William street. Elevator, Darling Bros., Dock street. Brick work of boiler house, P. Mooney & Sons, 112 Queen St.

Tilbury, Ont.

Rubber factory for Tilbury Rubberized Cloth Co. Representative, Lewis W. Fraser, mfr., Detroit, Mich. General contractor, John Magee, Canal street. Brick construction; special equipment for rubberizing cloth required.

Toronto, Ont.

Offices (alterations) to cost $17,000, 268 Adelaide street. Owners and builders, Monarch Realty & Security Co., 21 Adelaide street east. 6½-sty., terra cotta tile, marble and brick construction.

Factory to cost $6,000, Van Horn St. Owner and builder, J. T. Hepburn, 18 Vanhorn street. Engineers, Harkness & Oxley, Confederation Life Bldg. Cement foundation, brick and structural steel construction.

2 stores to cost $5,000, Bloor street W., for A. A. Barthelemes, 373 Keel St. General contractor, J. I. Miller, 23 Perth avenue. Builder, J. A. Harvey, 164 Bay street. 2-sty., stone foundation, brick construction.

3 stores and residence to cost $12,000, Roncesvalles avenue, for J. Kyle, 325 Dundas street. Architect, P. H. Finney, 79 Adelaide E. General contractor, J T Baldwin, 110 Sarah street Stone foundation, brick construction.

The Building & Construction Company Limited, 21 Adelaide street east, Toronto, have been awarded the complete contract for the renovation of the Saturday Night Building which is to be converted into a modern down town office building.

Garage to cost $2,500, Victoria street, for Dovercourt Land Building & Savings Co., cor Adelaide and Victoria streets. Architects, Chadwick & Beckett, 18 Toronto street Builders, Teagle & Son, 55 Boswell avenue Brick, structural steel, cement piers

Vancouver, B.C.

Bank building, cost $42,000, cor 7th and Granville streets, for The Royal Bank of Canada Architect, Thos Hooper, 739 Hastings street west General contractors, Pardy & Henderson, 543 Granville street. Two storeys, brick and terra cotta construction.

Warehouse to cost $75,000, Pacific and Richards streets, for the Merchants Ice & Cold Storage Co. Architect, Thos. Hooper, 739 Hastings street W. General contractor, The Norton Griffiths Steel Construction Co., 700 Granville street. Consulting engr., Philip Brown. 2-sty., 100 x 130, reinforced concrete construction.

Winnipeg, Man.

Warehouse to cost $3,000, for Stewart Sheaf Loader Co., Union street, architects and general contractors. 1-sty., 92 x 110, stone and concrete foundation, frame construction. Foundations in.

Warehouse to cost $38,000, James Ave., for The De Laval Separator Co., 11 Princess street. Architects and general contractors, Carter-Halls-Aldinger Co. Ltd. 3-sty., 50 x 100, concrete foundation, brick construction.

Residences

Chatham, Ont.

Residence, 3rd and King streets, for Dr. H. J. Sullivan. 2-sty., brick construction. Plans prepared.

Galt, Ont.

16 residences planned for The Plested Construction Co. 2-sty., brick construction, pine floors, hot air heating. Company has just been incorporated; capital $150,000. Provisional directors, J. A. Dobbie, F. S. Scott, C. Turnbull, J. H. Fryer, J. H. W. Plested, all of Galt.

London, Ont.

Dr. F. R. Eccles, Queen's avenue and Wellington street, will have old building torn down and plans prepared shortly for a new residence to cost $10,000.

Medicine Hat, Alta.

Residence to cost $3,000 (Lockwood) for Chas. Smith. 1½-sty., 36 x 28, frame, cement foundation. Plans drawn.

Residence to cost $3,000. Architect and builder, E. W. Stacey, 647 Broemer street. 1-sty., 28 x 38, cement foundation, frame construction Excavating started.

Montreal, Que.

Alterations to residence for Geo. A Slater, 1026 Dorchester street W Architect, J. H. McDowell, 111 Guy street, is preparing plans.

Residence to cost $8,000, DeVilliers, for Alfred Laroeque, 25 De Villiers St Architect, Rene Charbonneau. 3-sty., 50 x 60, stone foundation, brick construction. Plans drawn

Residence to cost $8,000, for Theo Lefebvre, 2231 Park avenue Architect, Paul Boisclair, 178 Champ de Mars 3-sty., 30 x 50, brick construction, cement foundation. Plans drawn.

New Westminster, B.C.

Residence to cost $10,000, for G. Adams, 732 12th street Architect, F. J. Boughen, 315 4th avenue, has prepared plans and tenders will be called immediately

Ottawa, Ont.

Residence to cost $3,200, for W. C. Ralph, 156 Turner street 23 x 30, brick veneer construction, cement foundation Plans in progress

Residence to cost $8,500, for Geo. A. Mason, Bayswater avenue Architect [illegible] Ewart, Sparks street, Ottawa. 3-sty., 33 x 40, stone foundation, brick veneer and stucco construction. Plans in progress.

St. John, N.B.

Residence, Clarendon street, for Ralph McCormick, Bellview. Plans in progress.

Tillsonburg, Ont.

Residence for F. Wilson. Architect, L. G. Jackson. 30 x 25, cement foundation, brick veneer construction. Plans in progress.

Toronto, Ont.

Residence to cost $14,000, St. Clair avenue and Dunvegan road, for Dr. H. F. Machell, 95 Bellvue avenue. Architect, Chas. P. Band, 36 Toronto street. 2½-sty., brick and tile construction, brick foundation. Plans drawn.

Alteration and addition to apartments to cost $15,000, Simcoe and University avenue. Architect, Len Foulds, 21 Leader Lane. 2-sty., brick construction, stone foundation. Plans in progress.

Residence, 757 Shaw street. Architect and builder, Geo. C. Annon, 503 Dupont street. Stone foundation, brick construction. Tenders called.

Residence for Wm. Stolery, 20 Elgin avenue. Architect, F. S. Baker, Traders Bank Bldg. 2½-sty., brick foundation, frame and brick veneer construction. Plans drawn.

2 residences to cost $5,000, 9-11 Windeat street, for Mrs. Margaret Mackey, 66 Conduit street. 2½-sty., brick construction, stone foundation. Plans drawn.

Residence to cost $3,000, Carlaw Ave., for Jno. W. Donson, 71 Frazzell avenue. 2-sty. and attic, brick foundation, brick construction. Plans drawn.

Residence to cost $8,000, 71 Indian Grove, for Wm. Halls & Son, 6 Park Place. Architect, J. W. Siddall, Janes Bldg. 2-sty., brick foundation and construction. Plans drawn.

Apartments to cost $18,000, Palmerston avenue. Architect, Mallory & Thatcher, 31 Queen W., are preparing plans but work has been postponed until next spring.

Residence to cost $3,500, Dixon Ave. Owner and builder, T. L. Guy, 118 Salem avenue. Tenders received by owner. 2-sty., stone foundation, brick construction.

Apartments to cost $15,000, Rowanwood avenue, for J. P. Milnes, 101 Roxboro street. Architect, C. B. Hoole, 6 Marlborough avenue. Tenders received by owner. 2-sty. and basement, stone foundation, brick construction.

Residence to cost $4,000, W. S. Pacific avenue, for W. J. R. Fowler, 119 Howard Park avenue. Architect, J. Hunt Stanford, cor. Bloor and Ossington avenue. 2½-sty., brick construction, stone foundation. Plans drawn.

Residence. Architect and builder, Amos Britton, 117 Pauline avenue. 2½-sty., brick construction and foundation. Plans drawn.

Residence to cost $4,000, for F. Napolitano, 31 Woodlawn avenue. Architect, J. H. Stanford, Bloor and Ossington. Stone foundation, brick construction. Plans drawn.

Residence, Oakmount road, for W. J. McNally, Cornwall Apartments, Bathurst. Architects, Eden Smith & Sons, 199 Yonge street. Mason, F. & A. E. Ham, 83 Salem. 2-sty., brick construction and foundation. Plans drawn.

Residence, garage and boat house to cost $15,000, Bank of the Port Credit River. Architect, A. J. Rattray, Stair Bldg. 1½-sty., cement foundation, terra cotta and stucco construction. Plans in progress.

Victoria, B.C.

Residence to cost $30,000, for Andrew Wright, 1006 St. Charles street. Architect, Philip M. Jullien, 313 Arts & Craft Bldg., Vancouver, B.C. 2-sty., 55 x 72, stone, stucco and frame construction. Tenders called.

Wingham, Ont.

Residences. John McLean, Shuter street, will have plans prepared at once for a number of workingmen's homes. Work may not start until spring.

CONTRACTS AWARDED

Brandon, Man.

Residence. Owner and general contractor, S. H. O'Neil, 653 11th street. 3-sty., 18 x 36, brick foundation, pressed brick construction. Excavation started.

Residence. Owner and general contractor, A. E. Skinner, 1137 Lorne Ave. 2-sty., 18 x 36, cement foundation, frame construction.

Brantford.

Residence for Mrs. Jane Sneath. Builder, A. J. Spicer. 2-sty., 22 x 40, stone and cement foundation, pressed brick construction.

Residence for Mrs. Lucy Howell. Builder, Jno. W. English. 2-sty. 26 x 45, cement foundation, sand lime brick construction.

Residence to cost $3,800 for Jno. T. Burrows. Builders, P. H. Secord & Sons, Ltd. 2-sty., 29 x 42, stone and cement foundation, pressed brick construction.

Calgary, Alta.

Residence to cost $5,000. Owner and builder, Jas. A. Hay, 1936 11th street W. 2-sty., 28 x 34, frame, cement foundation. Excavation started.

Residence to cost $4,000, for L. E. Smith, 506 4th street west. Architects and general contractors, McInnes Bros., 1126 15th avenue west. 2-sty., 30 x 32, frame, cement foundation.

Residence to cost $4,000, for Mrs. J. Mitchell, 1324 12th avenue west. Builder, W. V. Hill, 815 13th avenue west. 2-sty., 23 x 34, cement and brick foundation, frame construction. Excavation under way.

Residence to cost $5,000. Owner and general contractor, G. G. Jack, 231 14th avenue E. 2-sty., 26 x 37, frame, cement foundation.

Residence to cost $5,000, Rosedale, for A. W. Muros, c/o builder. Architect and general contractor, Lea & Goulding, 703 Sifton Blvd. 2-sty., 29 x 30, frame, cement foundation. Excavation started.

Residence to cost $4,000. Owner and builders, Brown & Chisholm, 1411 1st street west. 2-sty., 24 x 36, cement foundation, frame construction. Excavation started.

Residence to cost $5,000, 14th avenue, for J. A. Bell, 833 5th avenue. Builder and general contractor, A. E. Hull, 719 Centre avenue. 2-sty., 24 x 38, frame construction, cement foundation.

Residence to cost $7,500. Architect and general contractor, W. W. Duncan, 820 8th avenue west. 2-sty., 30 x 46, frame, cement foundation.

Residence to cost $4,000, for W. T. W. Little, 1311 2nd street west. Architect and general contractor, A. B. Hummellman, 2416 5th street west. 2-sty., 24 x 39, frame, cement foundation.

Residence to cost $4,500, Mount Royal. Owner and general contractor, C. H. Hart, 1804 5th street west. 2-sty., 22 x 42, frame, cement foundation. Excavation done.

Hamilton, Ont.

Residence to cost $6,000, Ancaster street, for F. H. Whitton, 353 Bay street S. Architects, Mills & Hutton, Bank of Hamilton Bldg. General contractor, Geo. R. Patterson, 265 Charlton avenue W. Masonry, concrete and plastering, J. Hendry, Ancaster, Ont. Electric wiring and fixtures, J. Shrieve, Ottawa St. 2½-sty., 46 ft. 6 in. x 34 ft. 3 in., frame and stucco construction.

Residence to cost $3,500, for M. Robertson, 694 King street E. Masonry, Smith Bros., 278 Cannon street E. 2-sty., brick construction, concrete foundation.

Residence for J. Miller, King street W. General contractor, F. H. Hall, 812 King street E. 2-sty., cement block construction.

2 residences to cost $6,000, Sherman avenue. Owner and general contractor, C. E. Ford, 6 Nightingale street. 2-sty., stone foundation, pressed brick construction. Permit issued.

Medicine Hat, Alta.

Apartment to cost $7,000. Architect and builder, L. J. Sexsmith. 2-sty., 25 x 60, brick, cement foundation. Excavating started.

Apartment to cost $65,000, for J. G. Bergman, architect and builder. 3-sty., 58 x 106, brick, cement foundation. Excavation started.

Residence to cost $3,500, School Ave. Architects and builders, Hotson & Leader, Main street. 2-sty., 22 x 38, frame, cement foundation.

Montreal, Que.

Residence to cost $6,000. Owner and builder, Joseph Page, 2188 St. Urbain. 3-sty., 25 x 61, brick veneer.

Residence to cost $10,200, Delanaudiers. Owner and builder, Louis Huberdeau, 391 Breboeuf. 3-sty., 50 x 67, stone veneer construction, stone foundation. Foundations in.

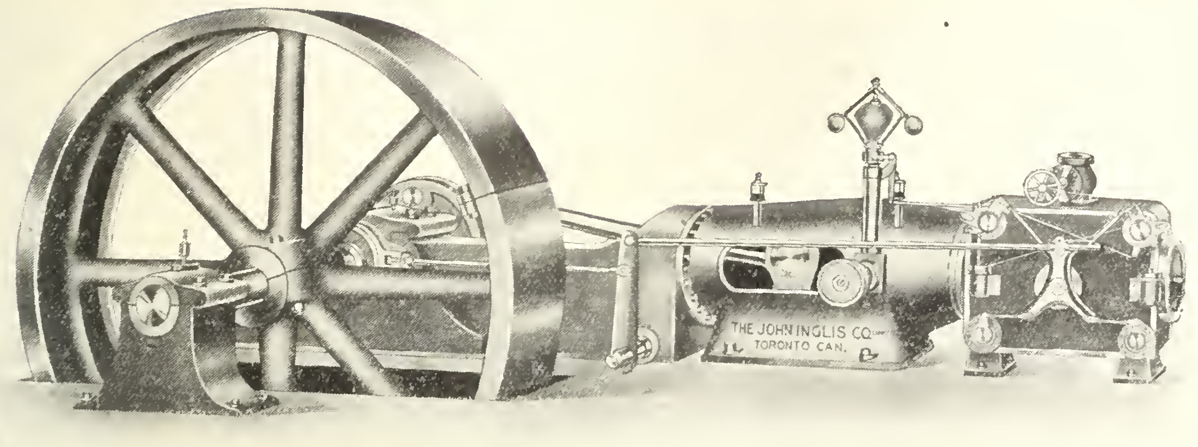
Residence to cost $4,000, 2425 Drolet. Owner and builder, H. Prud'homme, 522 Laval avenue. 2-sty., 25 x 40, cement foundation, brick construction.

Residence to cost $14,400, 97 St. Luke. Owner and builder, J. St. Pierre, 103 Fort street. 3-sty., cement foundation, pressed brick construction.

Residence to cost $4,800, St. Denis. Owner and builder, J. H. Blais, 633 Casgrain. 3-sty., 25 x 60, stone foundation, brick construction. Excavation started.

Residence to cost $4,000, St. Andre. Owner and builder, David Legault, 2935 St. Andre. 3-sty., 21 x 33, cement foundation, brick construction. Excavation started.

Residence to cost $3,000, for Denis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The John Inglis Co., Limited

ENGINEERS AND BOILERMAKERS

Strachan Avenue, TORONTO

[illegible] Cartier. Builder, S. Pare, 794 Cartier. 2-sty., 21 x 28, brick construction, stone foundation.

Residence to cost $3,000, St. Andre, for J. Dielgat, 80 Fairmount E. Builder, J. Pepin. 2-sty., 25 x 40, cement foundation, pressed brick construction.

Residence to cost $5,600. Owner and builder, C. & F. Dubois, 765 Garnier. 3-sty., 25 x 44, pressed brick construction, cement foundation. Foundations in.

Flats to cost $8,000, N. D. DeGrace. Owner and general contractor, Maurice Tessier, 214 Parc Cartier. Architect, R. Charbonneau, 15 St. James. 3-sty., 50 x 62, brick construction, cement foundation.

Flats to cost $9,600, Esplanade. Owner and builder, Augustin Handfield, 2161 St. Urbain. 3-sty., 50 x 65, stone foundation, brick construction.

2 residences to cost $9,600, Chambly. Owner and builder, E. Bissonnette, 344 Champlain. 3-sty., 60 x 50, cement foundation, brick construction.

Residence to cost $4,000, Chapleau. Owner and builder, Antoine Desforges, 1348 Amity. 3-sty., 25 x 40, stone construction, cement foundation. Excavation started.

2 residences to cost $7,200, Iberville, for Chas. Houlzet, 472 Frontenac. Builder, Philippe C. Jauvin. 3-sty., 53 x 45, cement foundation, cement block and brick veneer construction. Foundations in.

Flats to cost $7,200, for Madam A. Tessier, 682 Frontenac. Builder, Art. Tessier, 682 Frontenac. 3-sty., 66 x 40, brick construction, stone foundation.

Residence to cost $3,000, St. Andre. Owner and builder, A. Arcand, 2709 St. Andre. 2-sty., 25 x 45, cement foundation, brick construction.

Residence to cost $4,800. Owner and general contractor, Simeon Charpentier, L'Epiphanie, Que. Architect, Chas. Reeves, Maisonneuve, Que. 2-sty., 25 x 30, cement foundation, pressed brick construction.

Residence to cost $10,000. Owner and builder, Ovide Brunet, 425 St. Antoine. 3-sty., 65 x 56, brick, cement foundation.

Residence to cost $4,200, Bordeau, for Louis Seguin, 412 St. Catherine E. General contractor, J. A. Ouimet. 3-sty., 24 x 43, pressed brick, stone foundation.

Residence to cost $4,200. Owner and builder, Edmond Ernest Mitchell, 33 b. DeBeaujeu. 3-sty., 38 x 39, cement foundation, brick veneer construction. Excavating started.

Quebec, Que.

Apartment house to cost $4,500, St. Bernard, for Madam J. B. O. Gagnon, Scott street. Architect and general contractor, S. Breton, Richelieu street. Roofing, N. Barbeau. Ptg., Mr. Tardivel. Heating, plumbing, electric work, A. Picard Fils. 4-sty., 100 x 80, stone foundation, scotch brick and structural steel construction.

Toronto, Ont.

Residence to cost $4,000. Owner and builder, S. Price, 100 Westmorland Ave. Stone construction and foundation.

Residence to cost $3,000. Owner and builder, Chas. J. Poole, 2 Kingston Rd. 2-sty., brick construction anl foundation.

Residence to cost $3,800, Indian road, for S. Sharer, 402 Dovercourt road. 2½-sty., brick construction, stone foundation.

Vernon, B.C.

Residence, cost $6,240, for H. G. Nanyle. Architects, Bell & Constant. General contractor, H. G. Ogilvie. Two storeys and attic, 34 x 42, cement foundation, frame construction.

Winnipeg, Man.

Residence, cost $5,000, Dorchester St. Owner and general contractor, W. L. Copping, 800 Erin street. 2½ storeys, 26 x 28, stone foundation, frame construction.

Two residences, cost $8,000. Owner and general contractor, R. Karner, 749 Stella ave. Two storeys, 20 x 26, stone foundation, frame construction. Excavation done.

Residence, cost $3,000, Alverstone. Owner and general contractor, S. J. Hliddall, 702 Simcoe. 2½ storeys, 25 x 30, stone foundation, frame construction. Foundation in.

Two residences, $6,000. Owner and general contractor, S. Greenwood, Burnell street. 1½ storeys, 21 x 27 each, frame and stucco construction, concrete block foundation.

Residence, cost $7,000, MacMillan ave. Owner and general contractor, J. C. Fitzgerald, 511 Beresford ave. 2½ stys., 24 x 28, frame construction, stone foundation. Excavation under way.

Residence, cost $3,500, Yarwood ave., for A. Dunlop, 671 William ave., architect and general contractor. Two stys., 24 x 28, frame construction, stone foundation. Foundations in.

Power Plants, Electricity and Telephones

Forest, Ont.

Electric power house. Plans at office of engineer, H. A. McLean, C.E., Sarnia, and Town Clerk, Richard Karr. Tenders received by latter for erection of electric power house and construction of transmission lines.

Hanley, Sask.

Electric lighting plant, cost $11,000. Clerk, A. Holm. General contractors, The British Canadian & Supply Company, 122 Phoenix Bldg., Winnipeg, Man. For furnishing and installing complete electric lighting plant.

Prince Rupert, B.C.

Power plant contemplated for The Prince Rupert Hydro-electric Company. Manager, M. F. Clarke Durant. Work will start as soon as the necessary preparations are completed.

Regina, Sask.

Telephone Exchange building. Provincial Government, Dept. Railways, Telegraphs and Telephones. Architects, Storey & Van Egmond, Northern Bank Building. Plans, specifications, etc., may be obtained on application to department or to architects' office. Tenders received by Deputy Minister D. C. McNab until November 14th.

St. John, N.B.

Installation of electric lighting system for St. John City and Council Municipality Home, c/o Secretary, S. M. Wetmore, 81 Water street. Tenders received by architect, H. H. Mott, 13 Germain street, until Nov. 15th. Plans and specifications at his office.

Vancouver, B.C.

Ornamental street lighting standards, cost $19,400. Clerk, Wm. McQueen. City Electrician, W. T. Woodroffe. General contractors, Waugh, Meisner & Bailey, 16 Hastings street east. For cluster lights on Main, Granville, Harris and Hastings.

Wadena, Sask.

Electric light system, cost $20,000, is under consideration of the Town Council. Sec.-treas., F. M. Mugan.

Winnipeg, Man.

Electric meters. Engineer, J. G. Glassco, 54 King street. Contracts awarded to Canadian General Electric Co., for A.C. Meters. Canadian Westinghouse Co. for A.C. Meters. Ferrant Co., Ltd., for A. C. Meters. W. E. Skinner for D. C. Meters. To be ordered as required. Board of Control. Secretary, M. Peterson.

Electric lamps. Engineer, J. G. Glassco, 54 King street. General contractors, the Sunbeam Incandescent Lamp Company, 173 McDermot ave., for 15,000 carbon filament and 15,000 tungsten lamps. The Federal Engineering & Supply Co., rep. of Brimsdown Lamp Co., England, 5,000 carbon filament and 5,000 tungsten lamps. Board of Control, Secretary, M. Peterson.

Miscellaneous

Guelph, Ont.

Secretary Westervelt will secure information re installing a fire protection system for the Winter Fair Building and report to chairman of committee.

Ottawa, Ont.

Re erection and completion of Lobnitz rock breaker. Tenders received by Dom. Government, Dept. Public Works, Secretary, R. C. Desrochers, Ottawa, until Nov. 14. Plans at office of T. H. Schwitzer, Mech. Supt., Birks Building, Ottawa, C. E. W. Dodwell, District Engineer, Halifax, N.S., Dept. Ottawa and MacLean Daily Reports, Toronto.

Regina, Sask.

Fire fighting apparatus. The City Council contemplate installing auto pumping fire engine and hose wagon, auto double tank chemical wagon, auto for fire chief, 2,000 ft. high pressure hose, one Hart cellar pipe, 1,000 ft. fire hose; one Bowder life net, one life gun, three hose holders, three Cooper hose jackets, two smoke protectors, five alarm boxes, one hose sleigh. Above estimates were passed by Committee and Fire Chief. Clerk, A. W. Pool.

Victoria, B.C.

Cable, 12,000 ft. 10-pr. No. 16 cable and 2,000 ft. No. 16 Duplex Cable. Tenders received until Nov. 25.

Windsor, Ont.

Auto steam fire engine, cost $12,000, to be installed by City Council. Chairman of Committee, Nathan Irwin. Clerk, Stephen Lusted. By-law passed.

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Accurate results guaranteed.
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BUILT BY THE BUILDERS IRON FOUNDRY

INDISPENSABLE FOR ACCURATE MEASUREMENTS

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Discharge Lines of Pumping Engines The "slip" of a pumping engine was formerly thought to be due entirely to leakage past the plunger. Engineers now recognize that by far the greater part of the slip is caused by imperfect or worn valves and hence without a meter is an unknown quantity. The total "slip" is very rarely found to be less than 3, and it may run as high as 25 without being detected.

A Venturi Meter placed in the force main gives complete information regarding the daily operation and performance of the pumps. Any falling off in the rate of discharge is immediately indicated on a dial, a chart record is furnished of this rate for every hour of the day and night, and the total gallons pumped is shown on a counter dial. Thus at a comparatively low cost the Venturi becomes a highly important factor in operating the station economically. For other applications

See Bulletin 75

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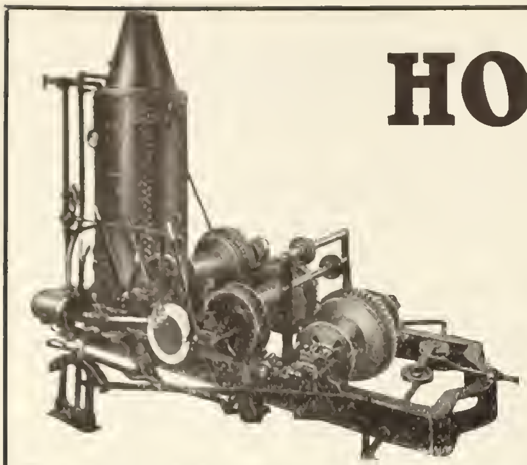

HOISTING ENGINES

Some of the strongest friends of the M. & H. Hoists are to be found among the men who have owned and used them. For instance the following written by one of the Lumber Kings of Canada—a man who telegraphed us an unsolicited order for another hoist not long ago.

"Answering your enquiry, I am pleased to state that the hoists with which you supplied me some years ago have given good satisfaction and have been in pretty constant use ever since.

No other Hoist in Canada has so many practical improvements as the M. & H. Hoist for 1912. Let us tell you about them.

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Prompt Shipments Guaranteed.

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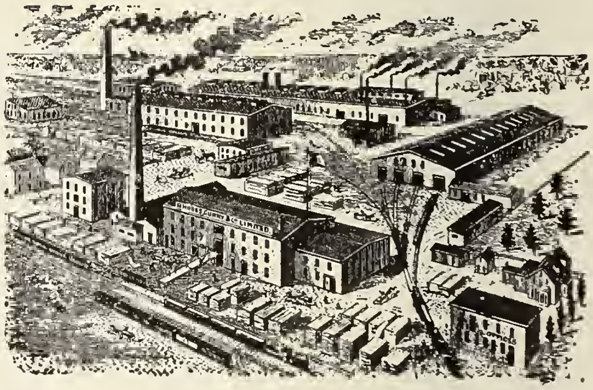

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- 1—No. 1 Full Circle Vulcan Traction Steam Shovel
- 1—Buckeye Trench Machine, cuts trench 24"x 7½'
- 1—Buckeye Trench Machine, cuts trench 27"x 10'
- 1—Buckeye Trench Machine, cuts trench 24" & 30" x 12'
- 1—Parson Trench Machine, cuts trench 28" to 60" x 20'
- 1—Municipal Trench Machine, cuts trench 24" to 72"x24'
- 1—1½ yd. Owens Clam Shell Bucket
- 2—1½ yd. Page Drag Line Buckets
- 1—1 yd. Obenberger Drag Line Bucket
- 5—1½ yd. Clam Shell Buckets (Brown Hoisting Mach. Co.)
- 1—J. I. Case 10 ton Steam Road Roller
- 1—Nat. Elevating Grader with horse and engine hitch
- 1—36 Gauge 16 ton 9x16-4 wheel Saddle Tank Locomotive
- 1—45 ton Vulcan Track Shovel

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BOOKS
for
Engineers and Contractors

The following books are offered at special prices, subject to previous sale:

Builders' Architectural Drawing Self-Taught, by Fred T. Hodgson. Published in 1904 by Frederick J. Drake & Co., Chicago. 262 pages, illustrated. Price 50c.

Architectural Hardwood Finishing, by George Whigelt. Published in 1906 by The Painters Magazine, New York. 124 pages. Price 50c.

Modern Workshop Hints, by Robert Grimshaw, M.E. Published in 1902 by Sampson Low, Marston & Company, London, Eng. 428 pages, illustrated. Price 50c.

Practical House Framing, by Albert Fair. Published in 1909 by Industrial Book Company, New York. 108 pages, illustrated. Price 50c.

Hints for Carpenters, by Albert Fair. Published in 1909 by the Industrial Book Company, New York. 144 pages, illustrated. Price 50c.

Architect, Owner and Builder Before the Law, by T. M. Clark. Publisted in 1905 by The MacMillan Company, New York. 387 pages. Price $1.00.

Properties of Steel Sections, by John C. Sample, C.E. Published in 1905 by McGaw Publishing Company, New York. 121 pages, illustrated. Price 50c.

Modern Plumbing, illustrated, by R. M. Starbuck. Published in 1907 by Norman W. Henley Publishing Company, New York. 329 pages, illustrated. Price $2.00.

Reinforced Concrete, by A. W. Buel. Published in 1906 by the Engineering News Publishing Company, New York. 500 pages, illustrated. Price $1.00.

Resistance of Materials, by N. de Tedasco and A. Maurel. Published in French, in 1911. 650 pages. Price $1.00.

The Sanitation of a Country House, by Dr. Harvey A. Bashore. Published in 1905 by John Wiley & Sons, New York. 98 pages, illustrated. Price 50c.

Modern Cement Sidewalk Construction, by Charles Palliser. Pub- B. T. Batsford, London. 776 pages, illustrated. Price 50c.

Modern Practical Carpentry, by George Ellis. Published in 1906 by B. T. Batsford, London. 372 pages. Price $1.50.

Light & Heavy Timber Framing Made Easy, by Fred T. Hodgson. Published in 1909 by Frederick J. Drake & Company, Chicago. 396 pages, illustrated. Price 50c.

Reinforced Concrete—A Manual of Practice, by Ernest McCullough, C.E. Published in 1908 by Cement Era Publishing Company. 126 pages, illustrated. Price 50c

A Practical Treatise on the Steel Square, by Fred T. Hodgson. Published in 1904 by Frederick J. Drake & Company, Chicago. 222 pages, illustrated. Price 50c.

The Up-to-Date Hardwood Finisher, by Fred T. Hodgson. Published in 1904 by Frederick J. Drake & Company, Chicago. 210 pages, illustrated. Price 50c.

Practical Concrete-Block Making, by Charles Palliser. Published in 1908 by Industrial Publication Company, New York. 74 pages, illustrated. Price 50c.

Engineering as a Vocation, by Ernest McCullough, C.E. Published in 1911 by David Williams Company, New York. 202 pages. Price 50 cents.

Hydraulic Cement, Its Properties, Testing and Use, by Frederick P. Spalding. Published by John Wiley & Sons, New York. 266 pages, illustrated. Price 50c.

The Building Mechanics' Ready Reference—Stone and Brick Masons' Edition, by H. G. Richey. Published in 1907 by John Wiley & Sons, New York. 266 pages, illustrated. Price 50c

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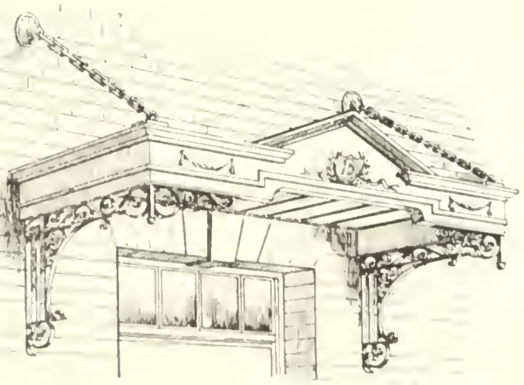

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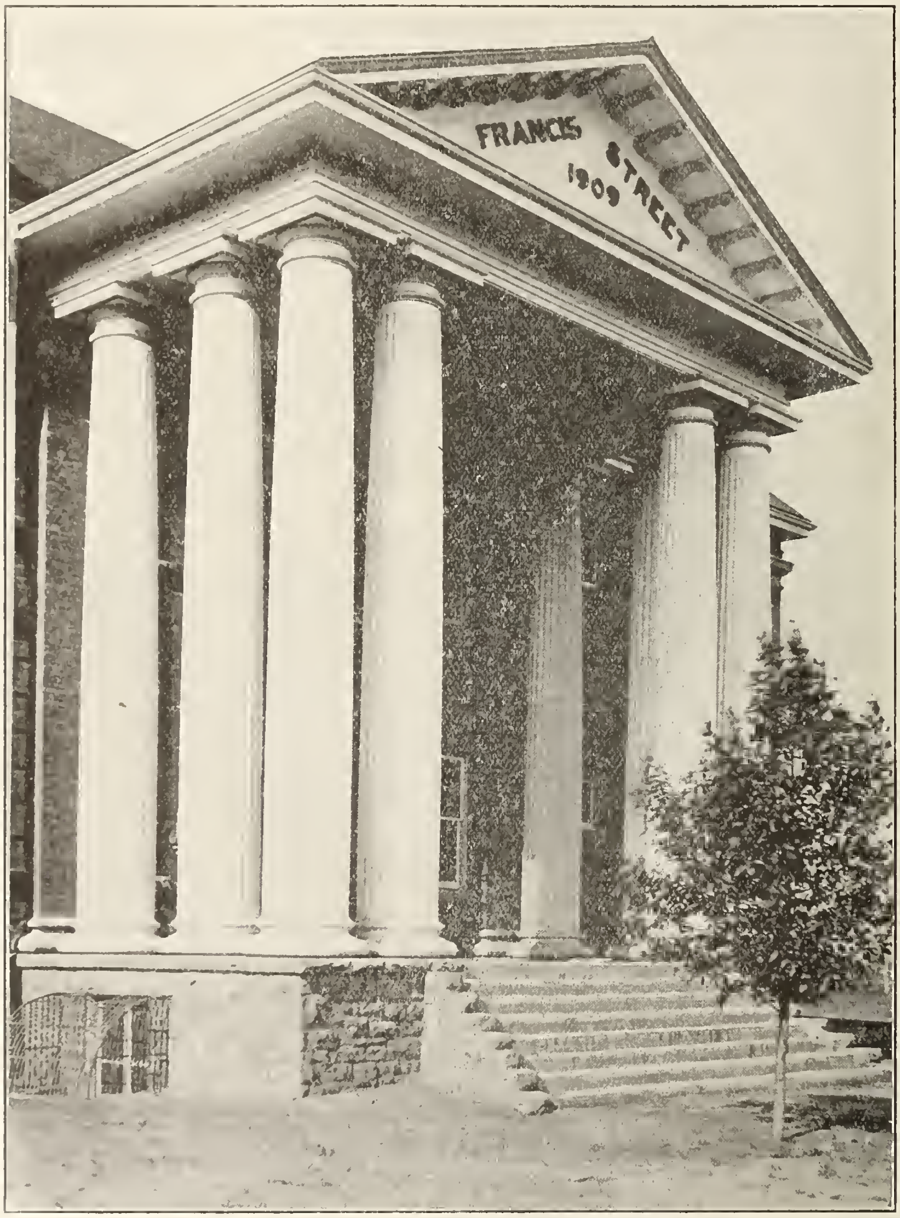

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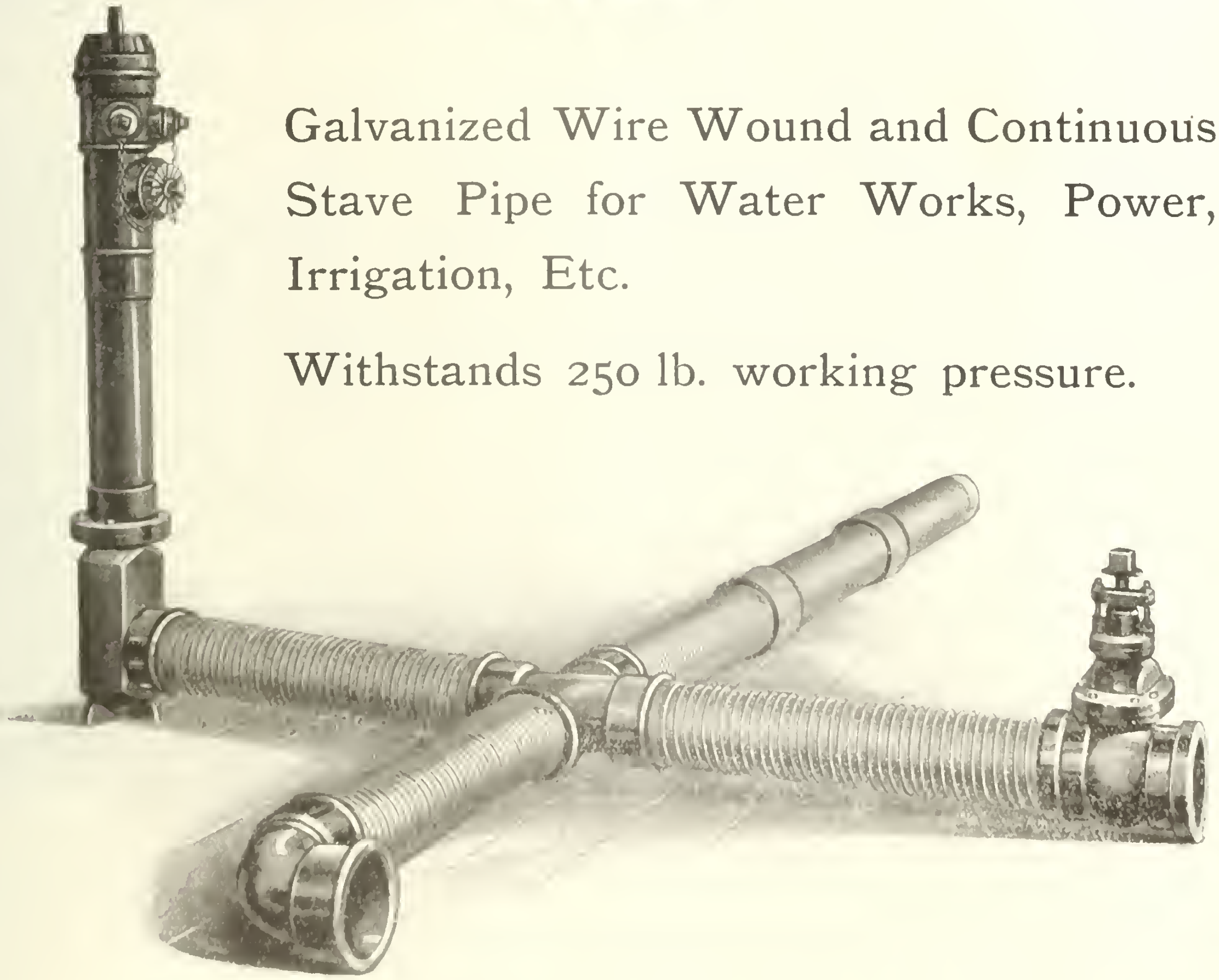

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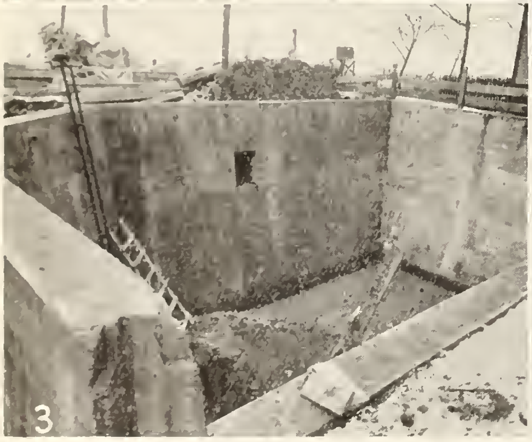
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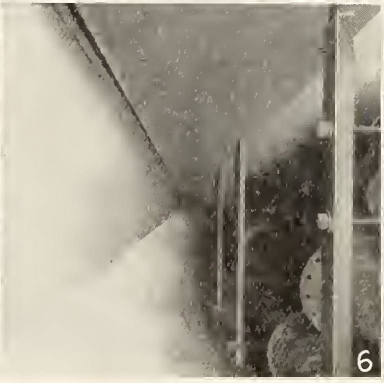
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1—Clarke Residence, Jacksonville, Florida. H. J. Klutho, Architect. Hercules Compound used in the aggregate of the concrete in the basement walls and floor construction.

2—Disposal Plant at Westfield, New York. F. K. Wing, Buffalo, New York, Engineer. Hercules Compound used throughout in the aggregate of the concrete construction.

3—Reservoir of Wheeling Traction Company, Wheeling, West Virginia. Hercules Compound used throughout in the aggregate of the concrete.

4—Buffalo General Electric Building, Buffalo, New York. Essenwein & Johnson, Architects. Hercules Compound used in the aggregate of the concrete in walls and floors, and in the plaster of the battery room columns.

5—Intercepting Sewer, Harrisburg, Pa., 3½ miles long. 25 tons Hercules Compound used in the aggregate of this concrete work. Wm. Opperman & Son, Contractors.

6—Tunnel Soldiers Home, Washington, D. C., 4000 feet long. Waterproofed by plaster coat of cement waterproofed with Hercules Compound.

7—Roofs of the L. & N. Railroad Terminal Sheds, Memphis, Tennessee, waterproofed with Hercules Compound in the aggregate of the concrete. Foster, Creighton & Gould, Nashville, Contractors.

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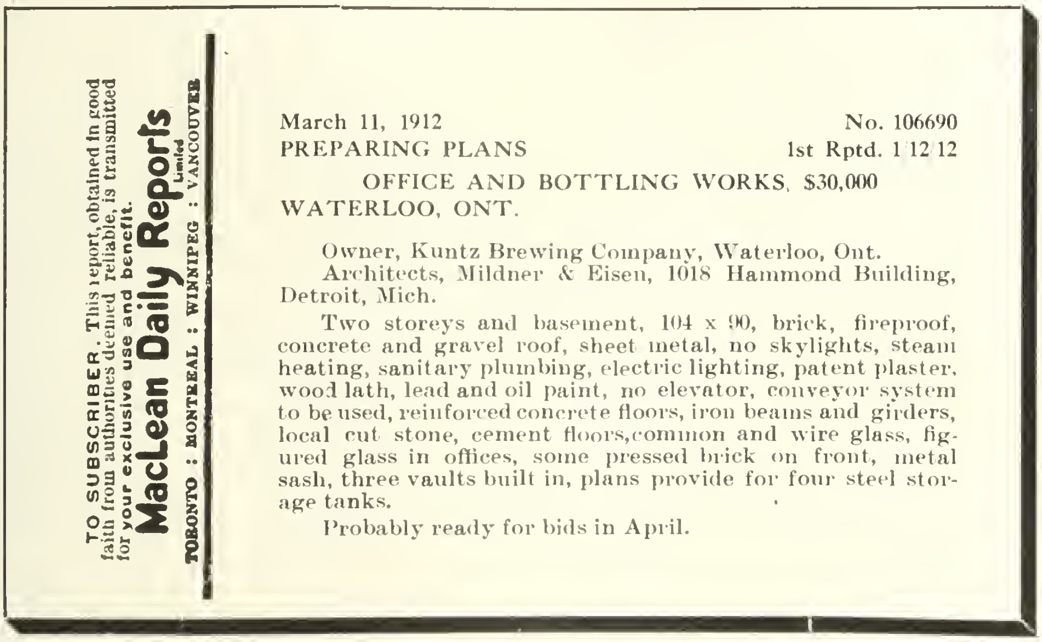

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March 11, 1912 No. 106690
PREPARING PLANS 1st Rptd. 1/12/12

OFFICE AND BOTTLING WORKS, $30,000
WATERLOO, ONT.

Owner, Kuntz Brewing Company, Waterloo, Ont.
Architects, Mildner & Eisen, 1018 Hammond Building, Detroit, Mich.

Two storeys and basement, 104 x 90, brick, fireproof, concrete and gravel roof, sheet metal, no skylights, steam heating, sanitary plumbing, electric lighting, patent plaster, wood lath, lead and oil paint, no elevator, conveyor system to be used, reinforced concrete floors, iron beams and girders, local cut stone, cement floors, common and wire glass, figured glass in offices, some pressed brick on front, metal sash, three vaults built in, plans provide for four steel storage tanks.

Probably ready for bids in April.

This illustrates the form in which firms in over two hundred **different** lines receive daily advice of opportunities for their getting business. Each subscriber receives reports relating to his business only. Each project is followed from its inception to completion—supplementary reports being issued as the work progesses. You are advised not only where but when there is business worth getting after. Charges are based upon the requirements of your own business. If you desire special information on any project we guarantee to supply you with a full report as soon as available from our reporters in the district mentioned. This special service is included in your contract. If you are a contractor or sell materials, supplies, furnishings or machinery your judgment will be to confer with us. Rate cards and sample reports on application.

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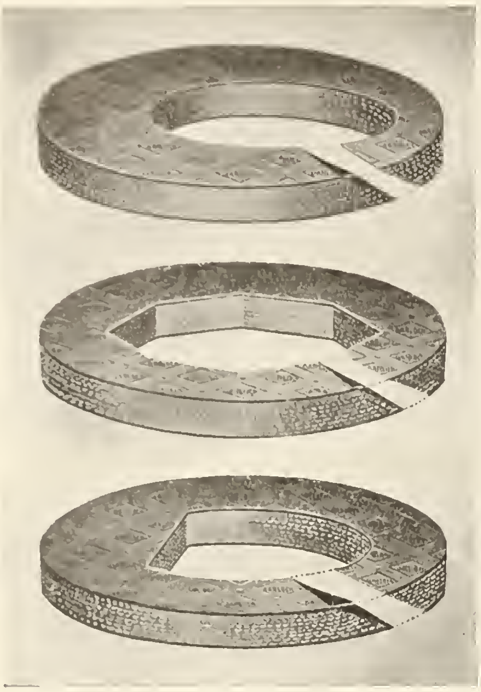

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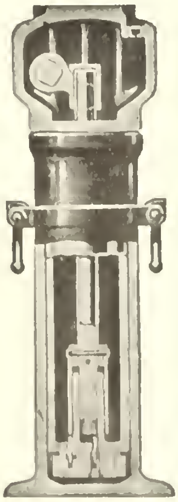

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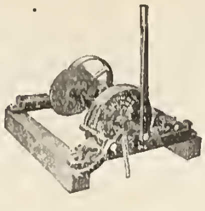

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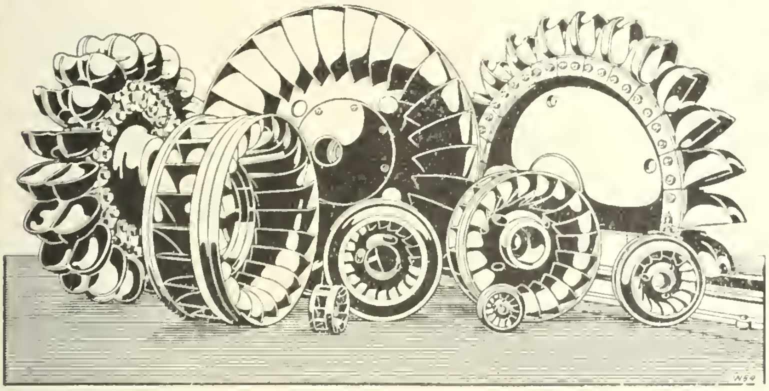

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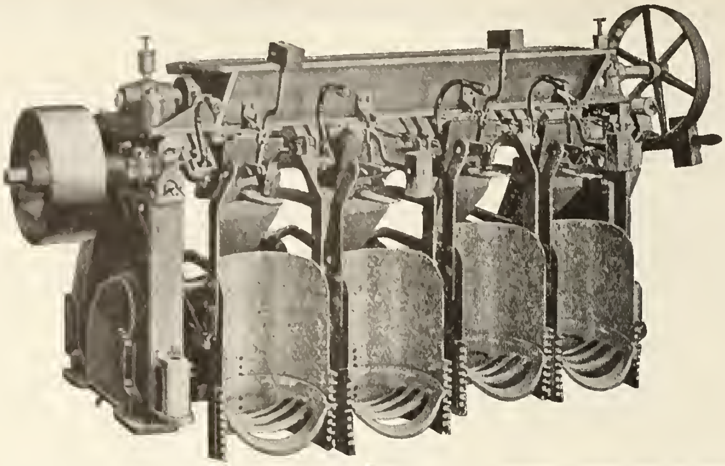

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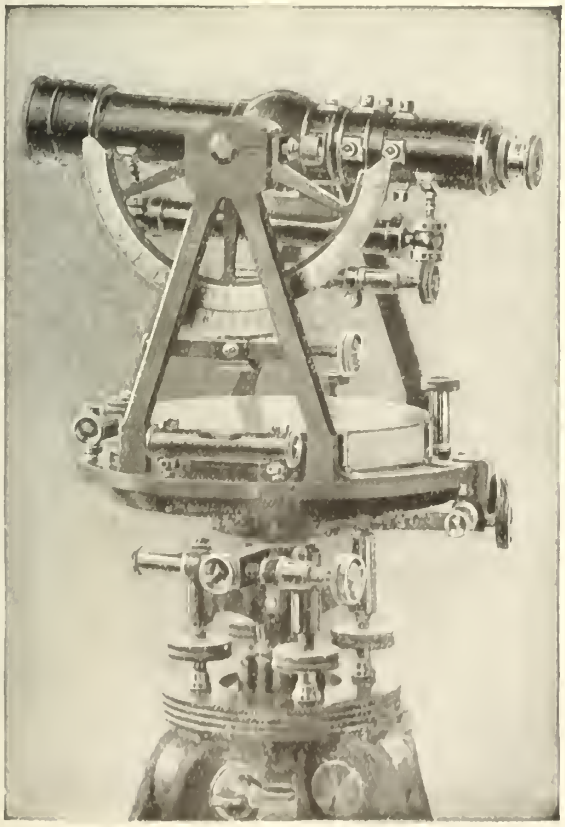

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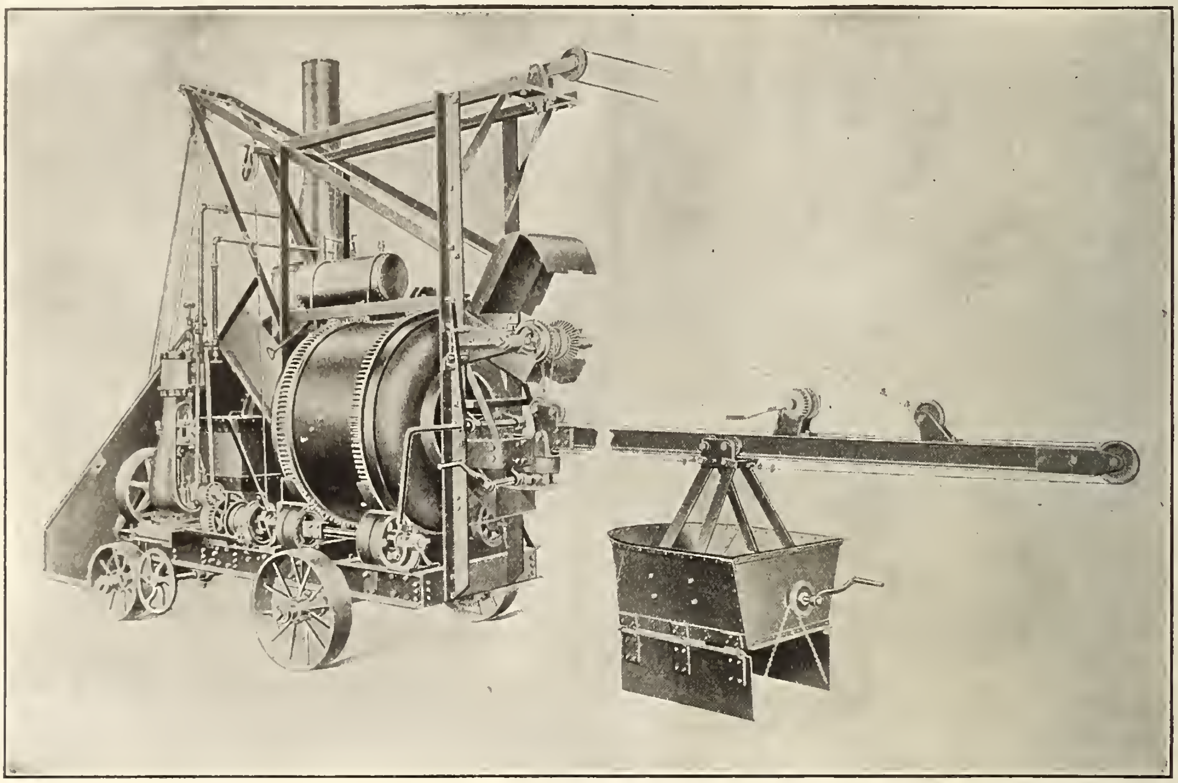

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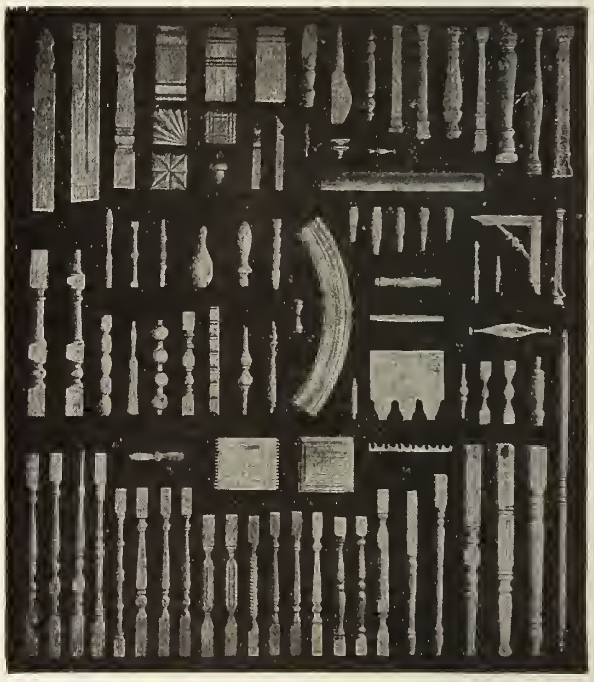

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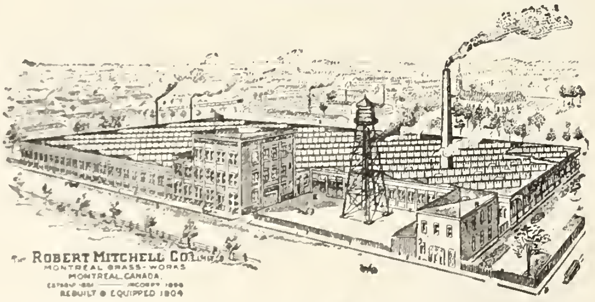
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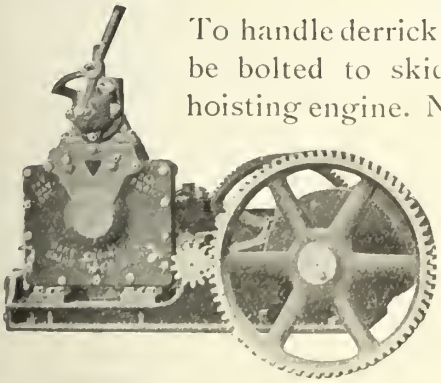

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Stone Dust Rubble Stone
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20 YEARS' EXPERIENCE IN CANADIAN OIL FIELD

Contracts taken in any part of Canada. Several years experience in Artesian Wells for Municipal Water Works. Estimates or geological information cheerfully furnished.

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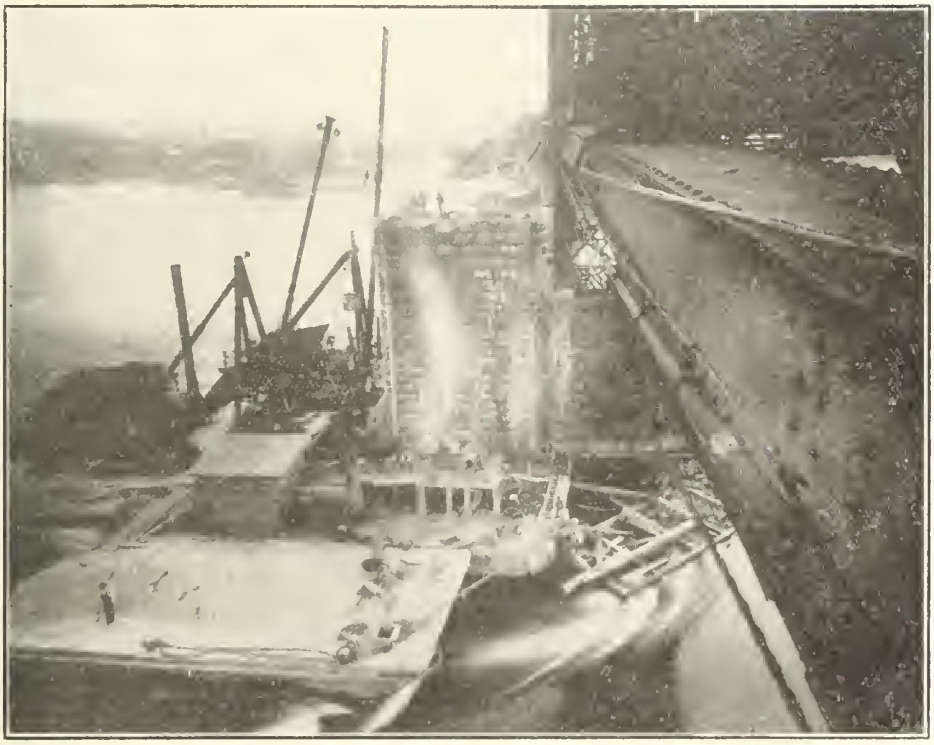

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WE HAVE HAD A LONG

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IN WORK OF THIS NATURE IN DEEP AND SWIFT RIVERS.

WE ALSO HAVE A LARGE EQUIPMENT OF

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AND ARE PREPARED AT ALL TIMES TO UNDERTAKE DIFFICULT WORK ON THE SHORTEST NOTICE.

OUR SCOPE:

BRIDGE PIERS — DOCKS — DAMS — SEA-WALLS — MINING SHAFTS — WHARVES
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We Invite Inquiries in Reference to Cost and Design of Difficult Foundation Work.

Orleans Filtration Plant and Concrete Building taking about 100,000 barrels of Alsen's New Cement

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

Practical Cost Data on

Herringbone Metal Lath

The ceiling of the Power House of the Toronto General Hospital measures one hundred and twenty yards net. One hundred and twenty-two yards of **Herringbone Lath** covered it completely, waste and lap included.

This is not a record; it is a typical case. The Herringbone selvage edge is the reason.

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, **Toronto**
Metal Shingle and Siding Co., Manufacturers

TENTS
for Engineers and Contractors

We are manufacturers of a very complete line of tents for engineers' and contractors' use and can make shipment the same day as order is received.

We also make engineers' and surveyors' clothing, in fact we can fit you completely for camp and survey trips.

Send for our catalogue
It will interest you

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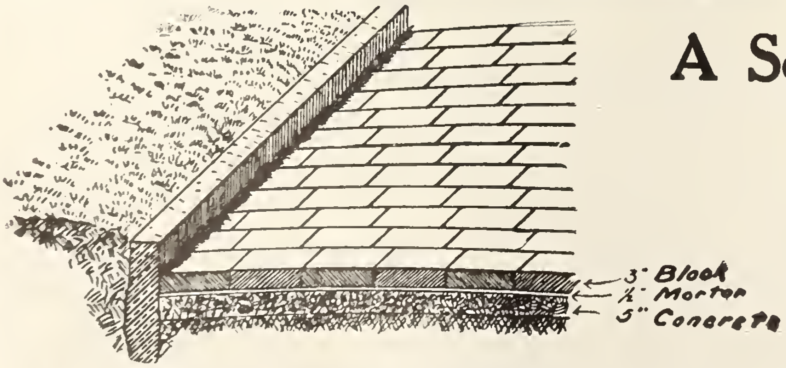
Woods Building - Ottawa, Ont.



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Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
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Hard Wall Plaster

HARD-WALL PLASTER HAMMER BRAND HILLSBOROUGH, N.B.

It neither loosens nor falls off, it allows carpenters to follow plasterers without loss of time and lasts as long as the building.

Albert Manufacturing Co.
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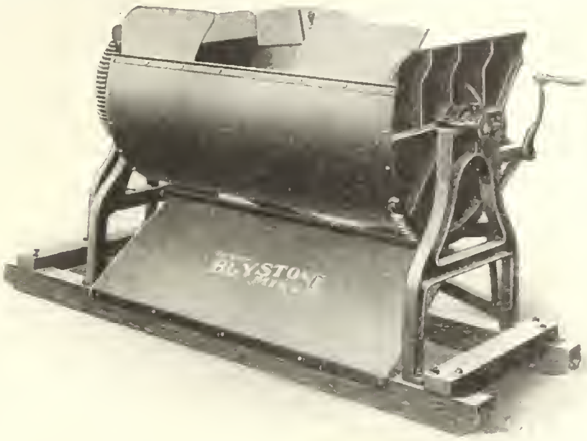
Time Saved in Concrete Mixing



The Blystone Skid Mixer

Every movement of this mixer is calculated to save time. The mixing is quick and thorough and the dumping, worked by the handle on the right will save moments at every batch turned out. Strongly built—all working parts carefully balanced.

The Blystone Machinery Company
61 Railroad St., CAMBRIDGE SPRINGS, Pa., U.S.A.
Full line of Blystone Mixers carried in stock by
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ROOFING THAT SAVES WORRY

When a roof is made of

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Shingles, you have the satisfaction of knowing that unless the building falls from under it that roof is up for all time.

You will not have to patch it or paint it every year or so to keep it watertight. When it's up, you are through with it,—and you'll save labor cost in putting it up.

Made of asbestos fibre interwoven into hydraulic cement, they are light-weight, tough and fire-proof. Write for Booklet C. R. giving information on asbestos Building Material.

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Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per M
No. 1 dry pressed red brick	$18 00
No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	11 00
Wire cut bricks for foundation work	12 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

LUMBER (Building Material)

Hemlock Lumber—		
2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00
Pine—		
1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pine Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	
Pine trim for paint finish—		
4 in. casing per 100 ft.	2 00	
5 in. casing per 100 ft.	2 25	
8 in. pine base, per 100 ft.	3 25	
10 in. pine base, per 100 ft.	4 25	
1 in. pine window stool	2 75	
Shingles—		
XXX B. C. Clear Shingles, per M.	3 60	
X B. Extras	3 50	
X. B. Clears	2 90	
No 1 pine lath, per M.	4 75	
No 2 pine lath	4 25	
No. 1 spruce lath	4 00	
Cedar Posts Fence—		
5 in at small end, each	25	
7 in at small end, each	35	
Hemlock lath	3 25	

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 20 per cent for Star and 25 per cent. for D.D.

	Star	D.D.
10 to 25 united inches	$4 25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24.00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots

MONTREAL

	Star	D.D
25	$3.25	$4.75
40	3.45	5.20
50	3.85	6.00
60	4.10	6.50
70	4.35	7.00
80	4.85	7.50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 per cent.

High grade compression work, 55 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 and 10 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.50

Square head brass cocks, 60 per cent.

Lead Pipe

Lead pipe, $7.50 net; lead waste, $9.00 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Gaivanized
¼ inch	$2.04	¼ inch	$2.86
⅜ "	2.04	⅜ "	2.86
½ "	2.72	½ "	3.57
¾ "	3.16	¾ "	4.31
1 "	4.54	1 "	6.19
1¼ "	6.19	1¼ "	8.44
1½ "	7.43	1½ "	10.13
2 "	9.90	2 "	13.50
2½ "	15.80	2½ "	21.56
3 "	20.75	3 "	28.31

Malleable fittings—Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 67½; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 and 10 per cent.

Plain steel bars, $2.05.

Square twisted bars, ¾ to 1¼, $2.15.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 65 per cent.

7 and 8-inch pipe, 50 per cent.

Sewer Pipes

4 in.	25c ft.	15-in.	1.35 ft
6-in.	40c ft.	18-in.	1.90 ft.
9-in.	65c ft.	20-in.	2.25 ft.
12 in.	1.00 ft.	24 in.	3.25 ft.

all less 60 per cent

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.80.

Cement, wholesale, car lots, f o.b Toronto, bags extra, $1.55.

Crushed stone, 2 inch, $1.30; 1 inch, $1.35; ¾ inch, $1 45.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3 50 per yard.

Grey coursing stone, delivered, $2 25 to $2 50 per yard

Sand, for cement or brick work, $1 15 a yard, f o.b. cars, Toronto siding.

Brown sills and heads, in the rough, delivered, 10 cents per foot

Rubble stone in car lots, $1 30 per ton

Steel channels and beams, $2 65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, 9.00 in car lots.

Lime, per cwt., delivered, not less than 1,500 lbs., 33 cents; white, 43 cents

Plaster of Paris, Anchor Brand, $1 50

Manilla Rope, best, per pound, 12½ cents

PAINT AND OILS

(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $9.00 per 100 lbs.

Boiled Linseed Oil, in barrels, 78c per gallon.

Raw Linseed Oil, in barrels, 75c per gallon.

Turpentine, in barrels, 60c per gallon.

Pure Red Lead, dry, $7 to $8 per 100 lbs.

Putty, pure linseed oil, in bulk, bbls., 3½c.

Putty, pure linseed oil, in 25 lb. tins, 4c.

McMYLER DERRICKS FOR SALE

Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turnover buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address

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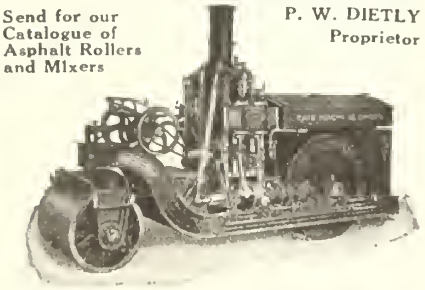

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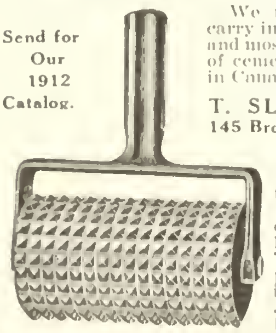

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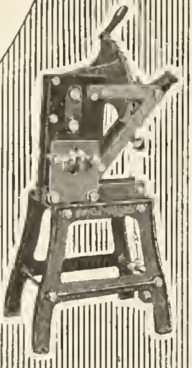

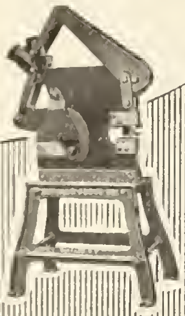

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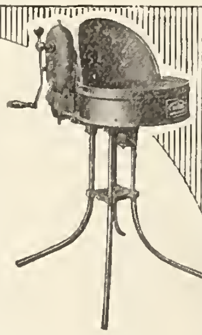
Among our recent designs is the Bar Cutter No. 10 for cutting concrete reinforced bars—twisted, round or any other shape. It cuts bars up to 1¼" thick and, due to its steel frame, its **weight is only half** that of a cast iron machine of the same capacity. Ask for catalog of Steel Punches, Shears and Drills No. 145.

Canadian Buffalo Forge Co.
MONTREAL Limited
St. John Winnipeg
Toronto Vancouver



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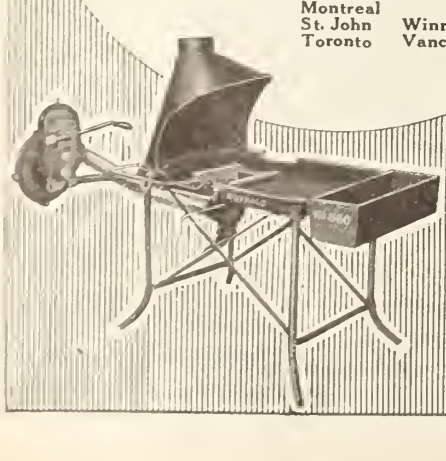
"Built to Last"

is the slogan of our **1912 Rivet Forge.** The repair cost by this design is guaranteed to be actually **cut in two,** compared with any other forge now in the market. A bridge company using a large number of forges writes us regarding it: "The operator claims it runs easier and heats more rivets in less time than any forge he has ever used." Let us send you one on free trial. Fifty other styles, for light and heavy work.

Canadian Buffalo Forge Co.
Limited
Montreal
St. John Winnipeg
Toronto Vancouver



STRUCTURAL WATER-PROOFING

Every water proofing problem must be handled by one of two methods—

The Integral Method
or
The Membraneous Method

Give us your details and we will determine the methods — most economic and efficient.

Dehydratine No. 1—A damp-proofing agent applied to inner walls—a furring substitute.
Dehydratine No. 2—A colorless material for external application on masonry.
Dehydratine No. 3.—For backing up cut stone—prevents staining of same.
Dehydratine No. 4—A foundation compound for walls, footings, etc.—renders same waterproof.
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Dehydratine Mastixement—A bituminous material used as a binder for Minerva Irish Felt.
Minerva Irish Felt—Considered by Engineers the best waterproofing medium in foundation work where pressures are to be met.

"The Dehydratines possess elasticity and durability which insure their permanence in the structure"

Hydratite—An inert substance for water-proofing concrete, stucco, etc.
Symentrex—A water-proof cement coating made in colors, for all exterior masonry surfaces and concrete floors.
Symentrin—"A near relative" to Symentrex, for interior plastered surfaces.
Bondsit—Bonds new to old concrete.

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"The Minerva Emblem Stands for Reliability"

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RUBBER COVERED TRADE ADANAC MARK WIRES AND CABLES

Are made according to the specifications of the National Board of Fire Underwriters. The conductors are drawn from copper of the highest conductivity, and are covered with two thicknesses of thoroughly vulcanized rubber compound of high quality. The wires are braided over insulation and the smooth high finish they receive makes them specially desirable for conduit work.

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White Lime - Stone - Grey Lime - Brick - Drain Tile

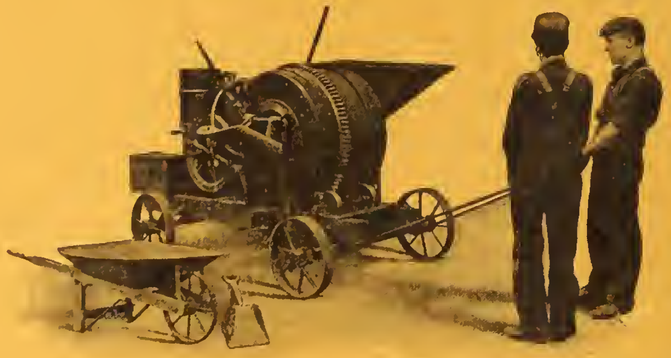
Everybody Who Builds

Concrete Walls, Concrete Walks or Curbs, Concrete Anything

Can have the best Concrete that can be made at the least possible cost

BECAUSE

Our No. 4 RANSOME MIXER



No. 4 Ransome Concrete Mixer.

is the equal of our larger machines in efficiency and is sold at a price which makes it an easy and a wise purchase for anybody.

It has a batch capacity of 4 cubic yards per hour, which is ample for any small concrete job. No. 4 Mixers are sold in one way only : i. e.—mounted on Trucks, with gasoline engine, direct drive. This is a powerful engine for its rated H. P. and the best designed—a most perfect operating engine.

The No. 4 Ransome is a great time saver in every respect. As we equip these machines with a special batch charging hopper, which is being filled while the batch in the drum is mixing—no time is lost in charging drum. By the simple lever arrangement, the whole unmixed batch is fed into the drum in an instant and the loading gang keeps right on with their work without any waits whatever. The batch is instantly discharged by merely reversing the discharge chute.

Let Us Send You Particulars

F. H. Hopkins & Co.

MONTREAL

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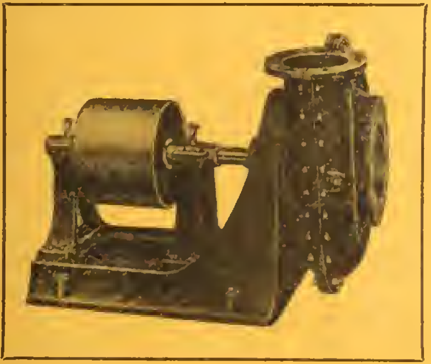
Vol. 26 Toronto, November 20, 1912 No. 47

ESTABLISHED 1886

Contract Record and Engineering Review

Steam and Power Pumps, Condensers, Travelling Cranes,



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Bent Glass

Made in all Kinds of Glass on Short Notice

Large Bent Plate Glass for Shop Fronts a Specialty

The Toronto Plate Glass Importing Company, Limited
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Air Compressors
OF BELLISS MAKE
have gained their reputation for

- Simplicity of Design
- Noiseless Running
- Compact Design
- Low Oil Consumption
- Continuous Operation
- Overall Efficiency

Messrs Belliss & Morcom, Ltd.
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Laurie & Lamb
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Continuous and Machine Banded Wood Stave

WATER PIPE

RESERVOIR TANKS

for city and town Water Systems, Fire Protection, Power Plants, Hydraulic Mining, Irrigation, etc. One-half the cost of Iron Pipe—and better.

Pacific Coast Pipe Co., Limited
P. O. Box 563 Vancouver, B. C.
Office and Factory, Granville St., near High Bridge
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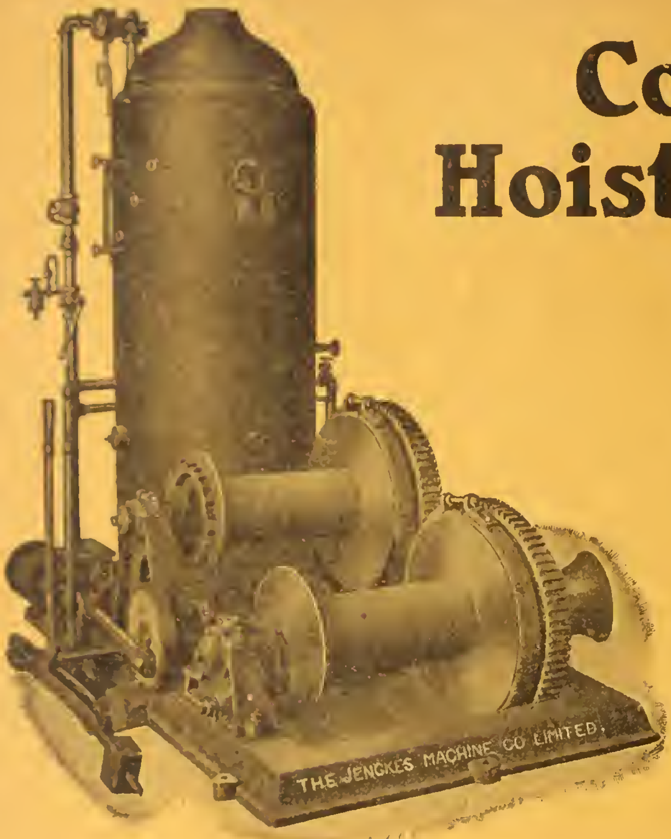

Contractors' Hoisting Engines

¶ Especially designed to fully meet the peculiar requirements of Contractors' work.

¶ Great care has been taken to secure maximum strength and rigidity without unnecessary weight.

¶ Built in all the popular sizes.

¶ Full particulars and prices to interested parties on request.

The
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Limited

General Offices: Sherbrooke, Que. **Works: Sherbrooke, Que. - St. Catharines, Ont.**
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PUT THEM

into the hardest kind of service

"AMERICAN" Wire Rope Blocks

will prove their makings and materials every time.

They will safeguard the lives of your men, your expensive material and your equipment.

They cost no more than the cheap kind but they're worth more.

American Hoist & Derrick Company, ST. PAUL, U. S. A.

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Vancouver Machinery Depot, Ltd., Vancouver, B. C. Stuart Machinery Co., Winnipeg, Man.

Concrete is the best and cheapest material for permanent paving of city streets as well as for country roads.

$$\frac{\$1{,}000}{\$6} = 166.6 \text{ miles.}$$

The cost of keeping a mile of macadam road in good condition for one year will pay for the maintenance of 166⅔ miles of concrete road for same period.

The first concrete road was built in Bellefontaine, Ohio, nineteen years ago. The cost of maintenance has averaged **$6 per mile per year.**

Six years ago New York State started to build 12,000 miles of macadam road. Fifty million dollars was voted for the work. To date, 3,674 miles have been improved, and $49,000,000 has already been spent—or over $13,000 a mile—and the present cost of maintenance, only six years after the first mile was built, is **$1,000 per mile per year.**

Is it any wonder that the New York Road Commission, in asking for another fifty millions, has promised the people to spend it for concrete highways?

Wayne County, Michigan, has built 33 miles of concrete roads since 1909, and the farmers of Wayne County are so well satisfied that they no longer consider macadam roads.

Canada's era of road building is just beginning. Will she profit by the experience of these other commonwealths? Will she spend her road money on roads that constantly need repair—or will she build permanent roads?

The engineers of our Free Information Department will gladly supply any information on concrete highways that is desired, without cost or obligation to the enquirer.

Canada Cement Company, Limited

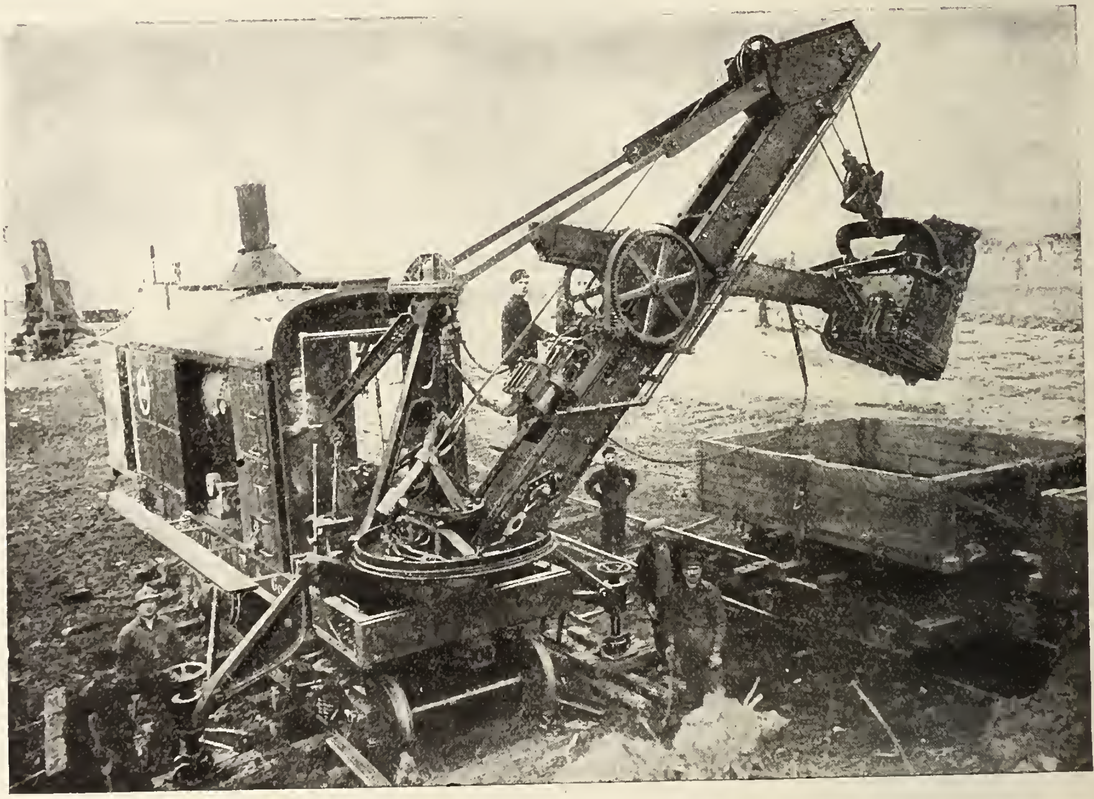
Head Office - Montreal

Sales Offices at

Montreal Toronto Winnipeg Calgary

Investigate

Bucyrus Steam Shove



STANDARD BUCYRUS SHOVELS

110 C—3½ to 6 yd. Dippers, 127 Tons
100 C—3½ to 5 " " 112 "
85 C—3 to 4 " " 101 "
70 C—2½ yd. to 3 yd. Dipper, 84 To
60 C—2½ " " 77
40 R—1½ " " 48

BUCYRUS REVOLVING SHOVELS

275 B — 5 yd. Dipper, 250 Tons
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Montreal, 318 St. James St.
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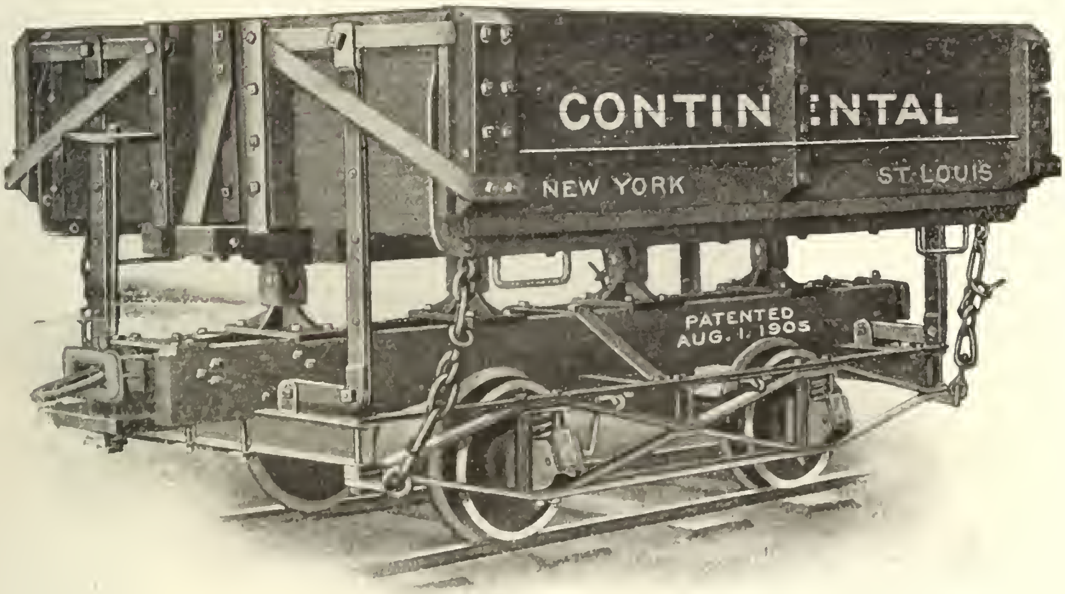
MUSSEN

Vhy Purchase Inferior Cars?

Means "Continental" Cars in the End, So Why Delay?



The Steep Dumping Angle, the Ease of Dumping and Righting the Car, the Track Clinging Ability, the Wide Door Opening, Malleable Castings and other special "Continental" features, are the real causes of "Continental" Cars having been made standard by contractors. Capacity 1½ yards to 30 yards, with or without air dump and air brake.

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(Continued on page 12)

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New Residence for Lieutenant Governor of Ontario, Toronto. Provincial Architect Heakes, Architect.
Don Valley Brick and Porous Terra Cotta used throughout.

Don Valley Bricks

are used in the construction of the most important public buildings erected by the Provincial Government. They are specified by the leading architects for every building of importance. The latest example of the public recognition of their superiority is found in their use for the new Toronto Residence of the Lieutenant Governor of Ontario. Don Valley Bricks possess a beauty of color and an even texture and form which add that touch of distinction to a building that characterises it as fulfilling the essentials of decorative dignity.

Don Valley Hollow Tile Fireproofing is absolutely dependable for that structural strength necessary to resist the action of age or any other deteriorating influence. For many years its success as a staple and fireproof building material has been established in hundreds of practical tests in buildings throughout the country.

"SPECIFY DON VALLEY PRODUCTS"

THE DON VALLEY BRICK WORKS

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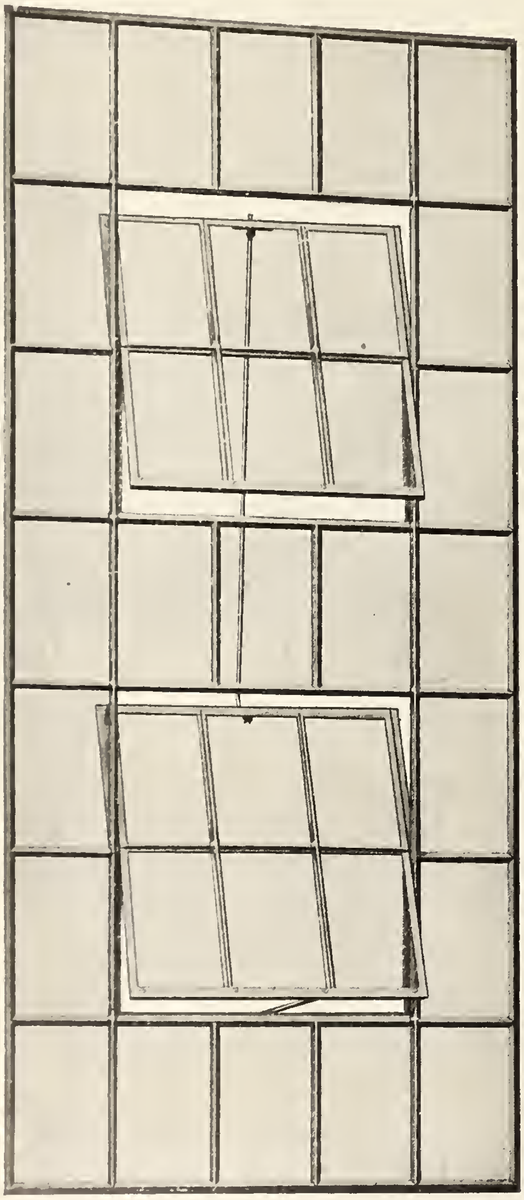
LET IN THE LIGHT



"Fenestra"

"Fenestra"
TRADE MARK

Solid Steel Sash

will afford

More Light—Better Ventilation

in any building where they are installed. "Fenestra" is a high-grade steel patented joint sash—it takes up minimum space and permits the maximum passage of light through the window.

"Fenestra" Solid Steel Sash requires no frame, sash weights or heavy mullions—the cost is thereby reduced so that the price compares favorably with the price of wooden sash even when the price is higher it is more than compensated for by the enormous advantages gained in

Strength, Durability, Handsome Appearance,
Weather Proofness and Fire-resisting Qualities

Besides that consider the permanence of steel as compared with wood and remember that with "Fenestra" Solid Steel Sash you save all the up-keep costs entailed by wooden sash and frames—in a big building that is a big item.

"Fenestra" Solid Steel Sash

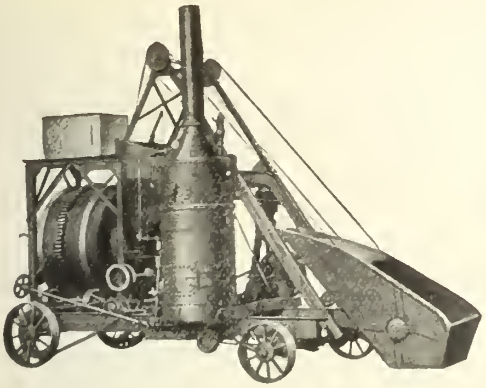
proves itself an economy wherever used but is particularly suitable for

Factories, Foundries, Power-Houses, Prisons
Railroad Shops, Warehouses, Barracks, etc.

We will help you to settle the problem of your window requirements—write us.

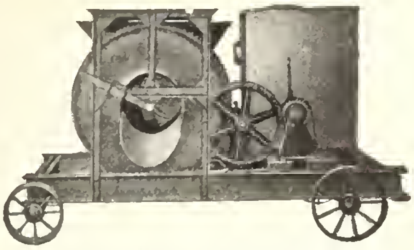
STEEL and RADIATION, Limited

TORONTO, CANADA



London Paving Machine with Front Loader

London Concrete Machinery **is built up to a standard.**



London Standard Batch Mixer with Charging Bin, Gasoline Power

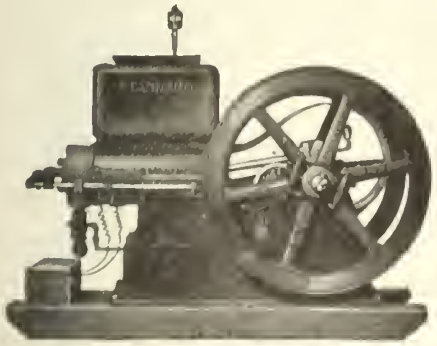
CONTRACTORS—It is worth something to you to know that when you use the LONDON MACHINES you have an equipment which is not a back number.

All OUR MACHINES are built by up-to-date METHODS and by the MANY NEW and IMPROVED FEATURES of the LONDON MACHINES place them in A CLASS by themselves.

London Face Down Concrete Block Machine

We are saving the Contractor money in the COST OF MACHINE, COST OF OPERATING, COST OF MAINTENANCE, everything made in our own shops. We sell direct to the contractor.

We are the only large Canadian Firm who specialize on Concrete Machinery.



Standard Gas Engine, made in all sizes

Send for
1912
Catalogue

stating LINE interested in. We manufacture a full line of Concrete Machinery and Cement Working Tools.

London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

AGENTS:

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General Supply Co. of Canada, Ottawa, Ont.

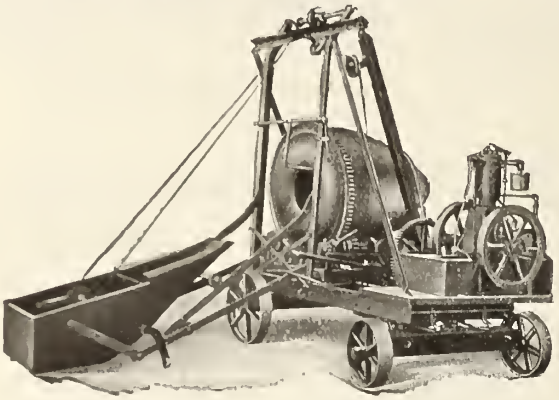
We are the Largest Manufacturers of Concrete Machinery in Canada

For Any Rush Job

You Are Forced to Admit

that

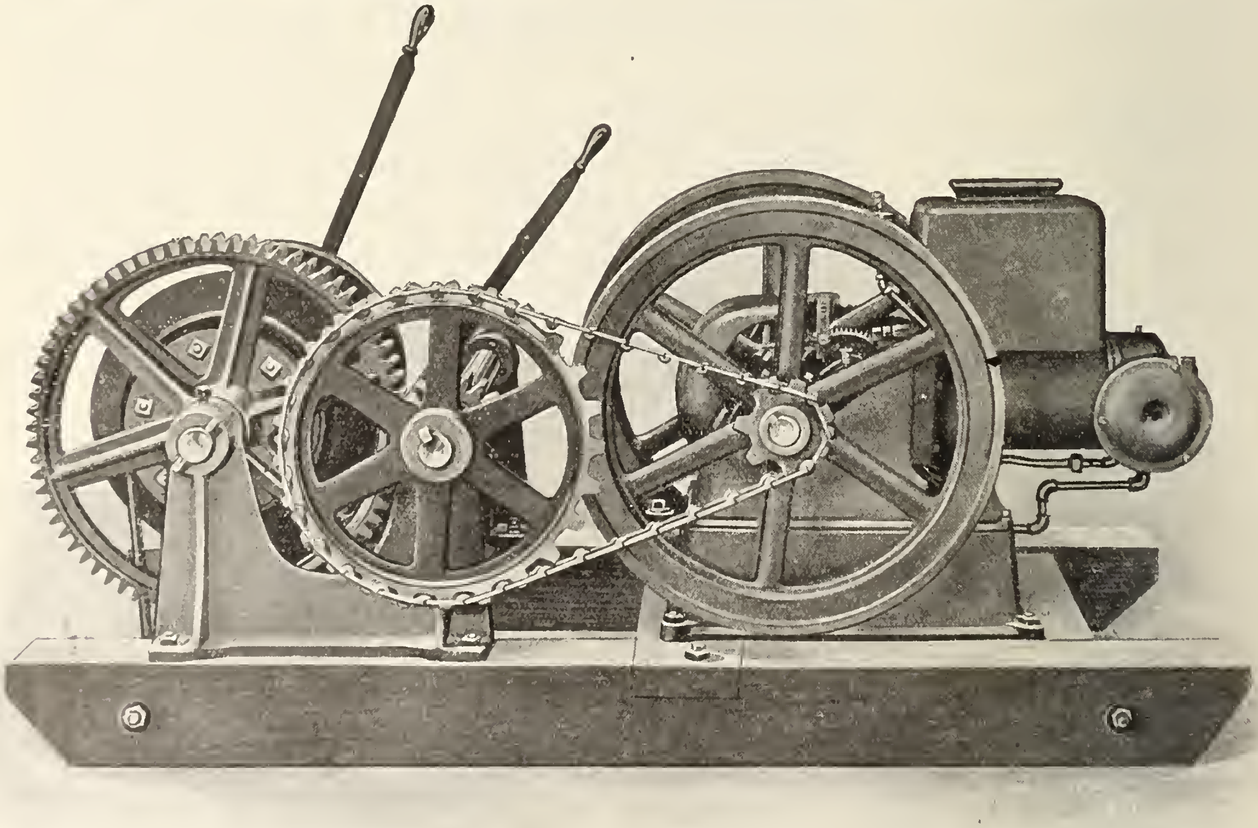
The Wettlaufer Improved Heartshape Mixer



Wettlaufer No. 1 Heartshape Mixer

will stand up to the work and see the job through with a certainty of good results that you can absolutely rely on. It will make yours a more profitable job by doing quick and perfect work with no stops for repairs.

Automatic operation—low running cost
Economical working throughout



Wettlaufer Single Drum Hoist No. 1

The most useful and complete hoist for all building and contracting purposes. Its compactness size and general handiness give it great advantages over the ordinary large cumbersome hoist and enable it to be easily moved around from one part of the job to another. Its capacity for work and general utility are unlimited.

Let us send you particulars of our Hoists and Mixers—or come and see them. Continuous Demonstrations at

WETTLAUFER BROTHERS

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Steelcrete
TRADE MARK
CONSOLIDATED

WHY

Steelcrete
TRADE MARK
CONSOLIDATED

Reinforcement is Superior to all Others

(12 REASONS)

Theoretical Considerations

(1) **It possesses a high elastic limit—not less than 55,000 lbs. per sq. in.** This is not attained at the sacrifice of quality or uniformity. "Steelcrete" is not a brittle and inferior steel but a tough, cold-drawn product with no equal in the market for uniformity of strength.

(2) **It provides against concentrated loads.** Its diamond-shaped structure enables it to distribute the effect of a sudden local load over a great many strands.

(3) **Attains a perfect bond in the concrete.** This is due to its mesh shape which does not permit any slipping and there is no possibility of it.

(4) **Perfect distribution of Steel.** Every foot of width possesses the theoretical amount of steel. The accuracy here attained is impossible in loose rod reinforcement.

(5) **Longitudinal reinforcement.** "Steelcrete" mesh possesses strength in the longitudinal direction of the pipe equal to one third the strength in the circumferential direction.

(6) **Temperature stresses are guarded against.** The form of the mesh provides a positive reinforcement against these uncertain but definite stresses.

Practical Considerations

(7) **"Steelcrete" mesh is essentially a fool-proof reinforcement.** With the use of this material the man with the brains that designs the construction obtains an efficiency of 100 per cent. with ordinary every-day inspection and unskilled labour.

(8) **"Steelcrete" Mesh is a stiff reinforcement.** It holds its position in the forms in a way that no other mesh equals. It is far more important to have the reinforcement placed correctly in a vertical direction than in the horizontal.

(9) **It is cheaper to install.** Requires less labour than any other mesh or system of rods.

(10) **It is easy of inspection.** Only those who know "Steelcrete" know the trouble, delay and anxiety this saves to both contractor and engineer alike.

(11) **It can be placed quickly.** This means a saving in overhead charges. This feature has been overlooked by a great many engineers and architects in the past.

(12) ALFRED ROGERS IS NOW CARRYING IN STOCK HALF MILLION SQUARE FEET OF "STEELCRETE" FOR IMMEDIATE DELIVERY.

ROGERS

Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

ROGERS

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery—Send us your orders for crushed stone.

ROGERS

French Caen Stone Cement

Monarque Brand and Cementa-line. Rich in appearance and of unlimited durability—as good as natural stone—but cheaper. Full particulars on request.

Quotations made for all Work Prompt Deliveries and Complete Shipments given from Stock

Alfred Rogers Limited

28 King St. West **Toronto, Ontario.**

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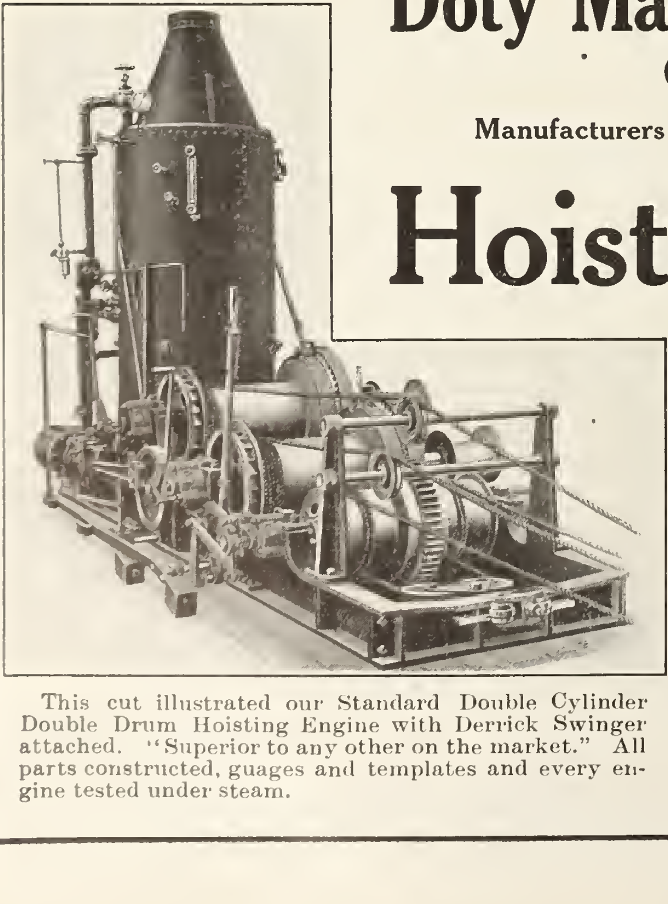

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A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

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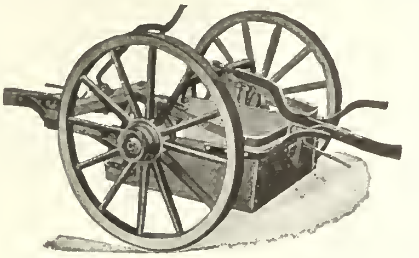

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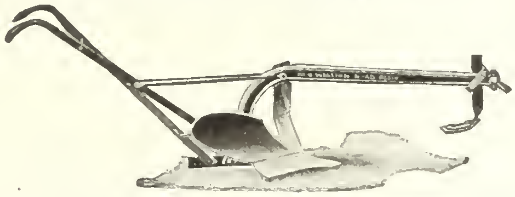
"Western" Line of Wheeled and Drag Scrapers and Grading Plows



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The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902
Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

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1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
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Total $376.17 or 5 2/3c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

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Metal roofs require painting every few years, most ready roofings require coating regularly, but with Barrett Specification Roofs **there is no maintenance expense.**

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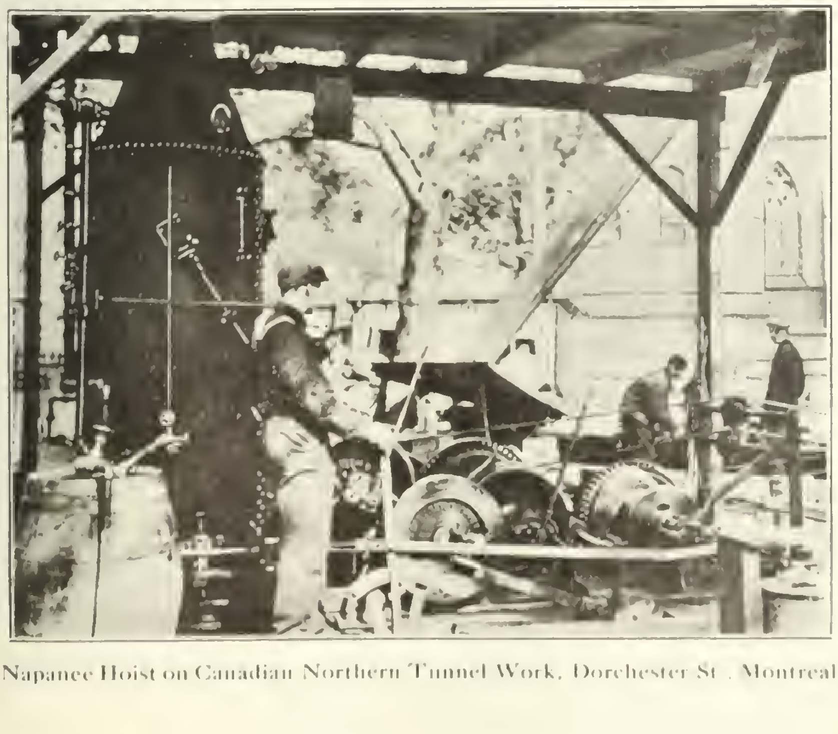

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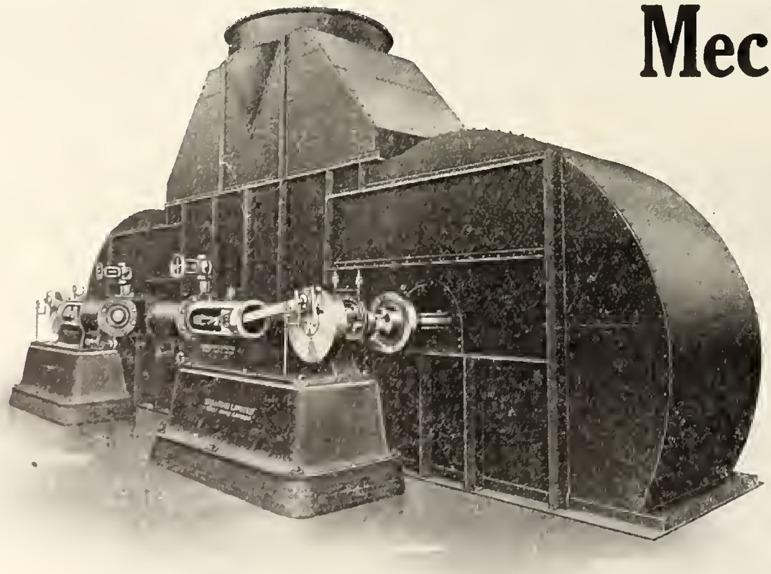

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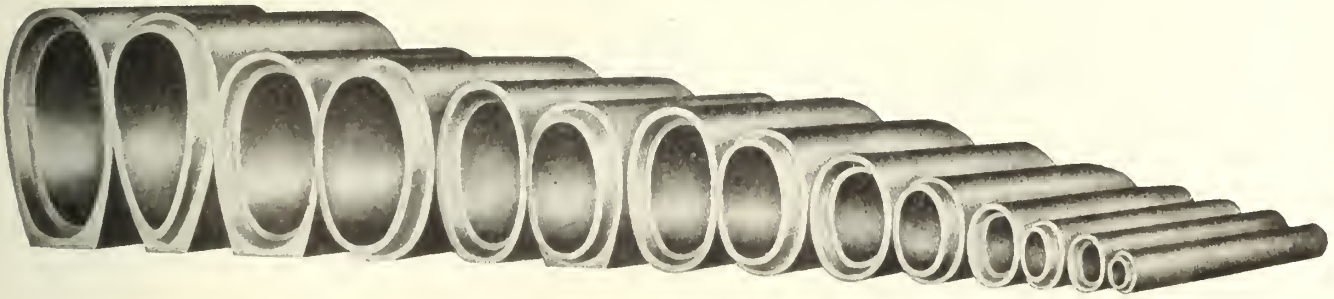

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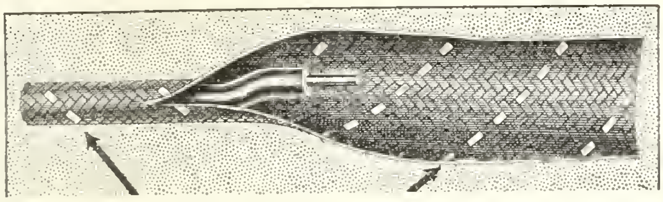

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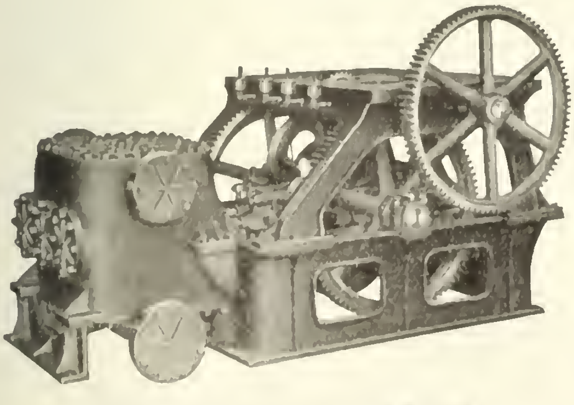

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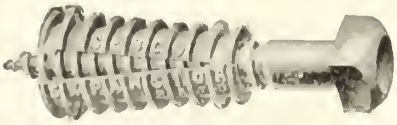

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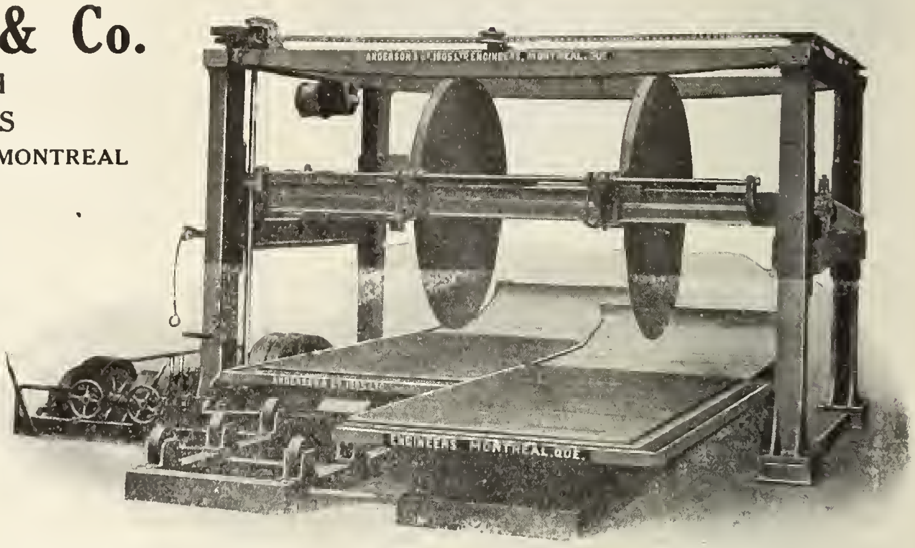

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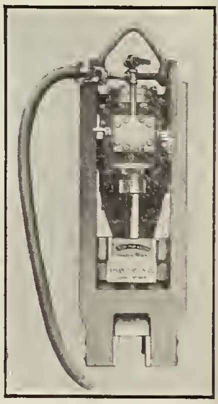

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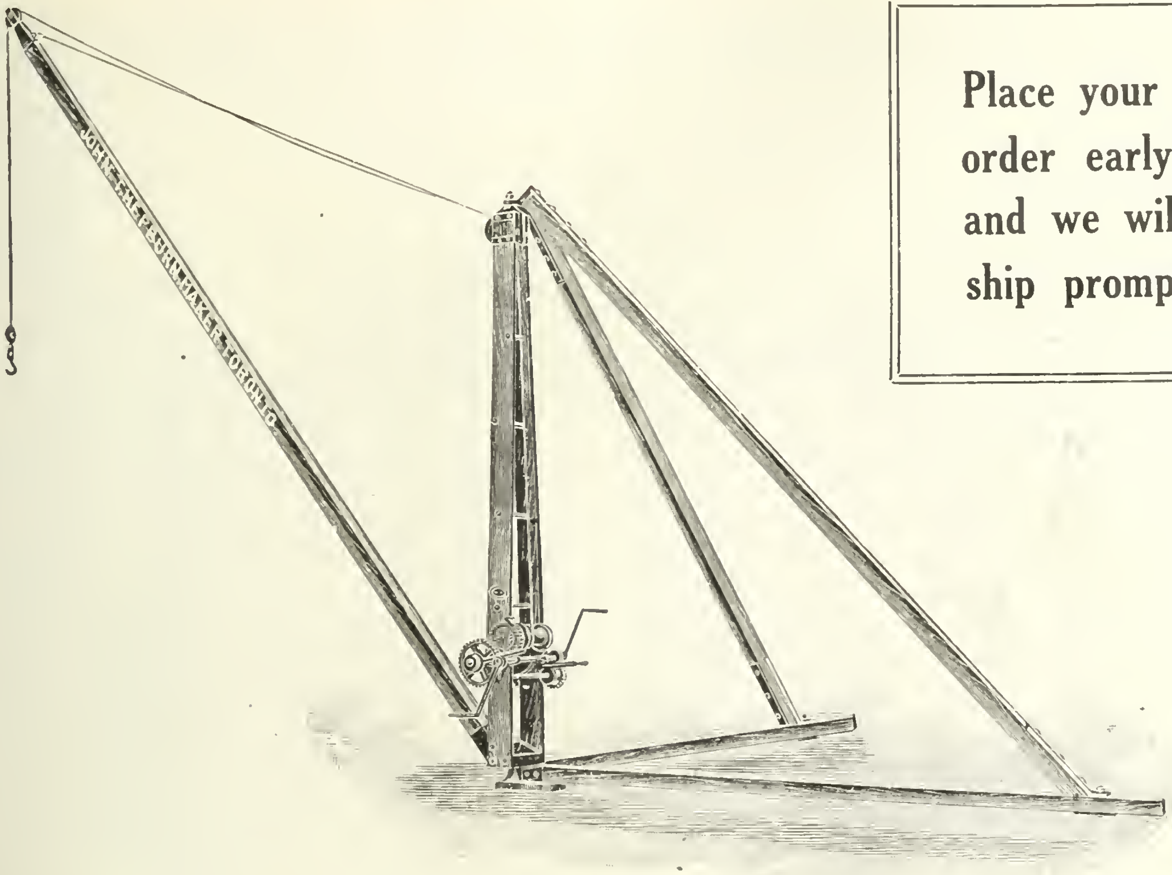
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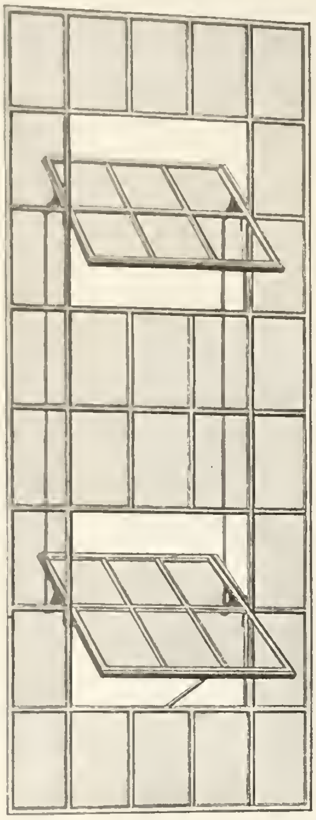

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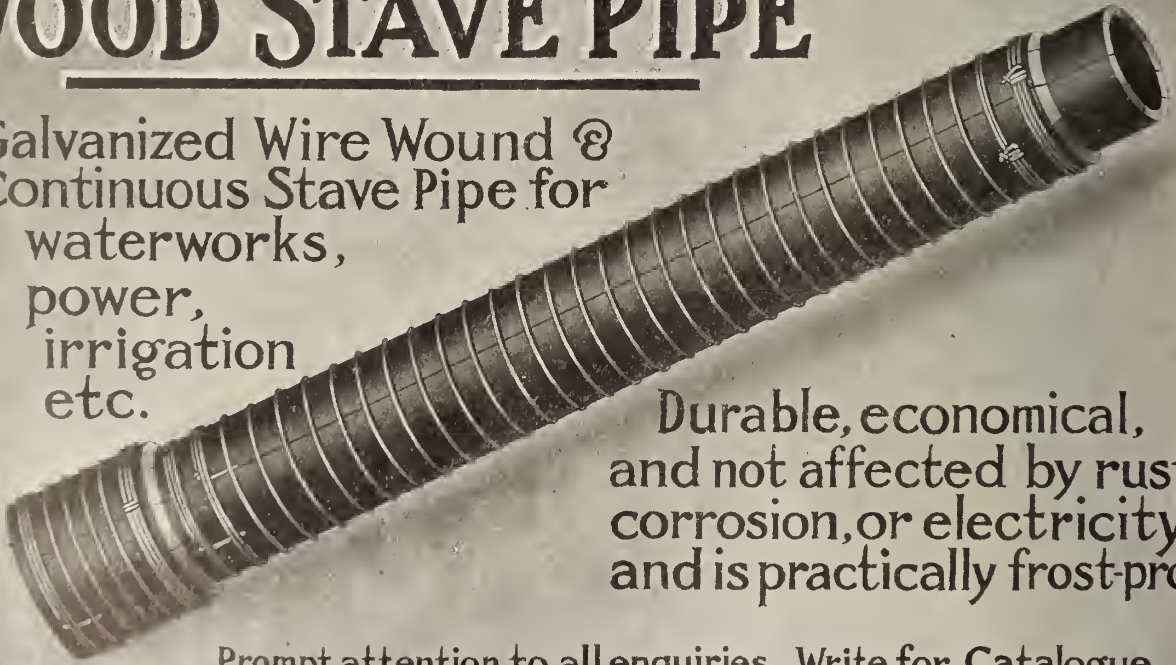

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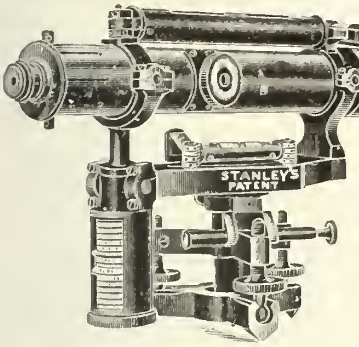

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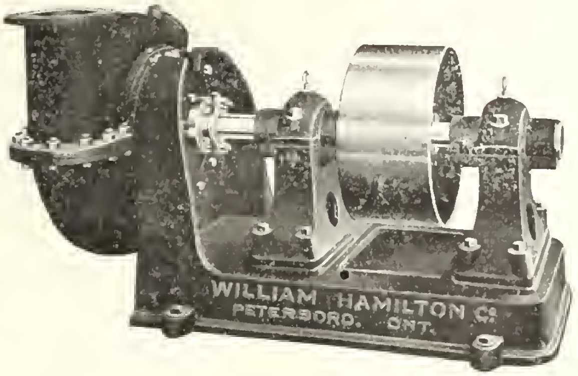

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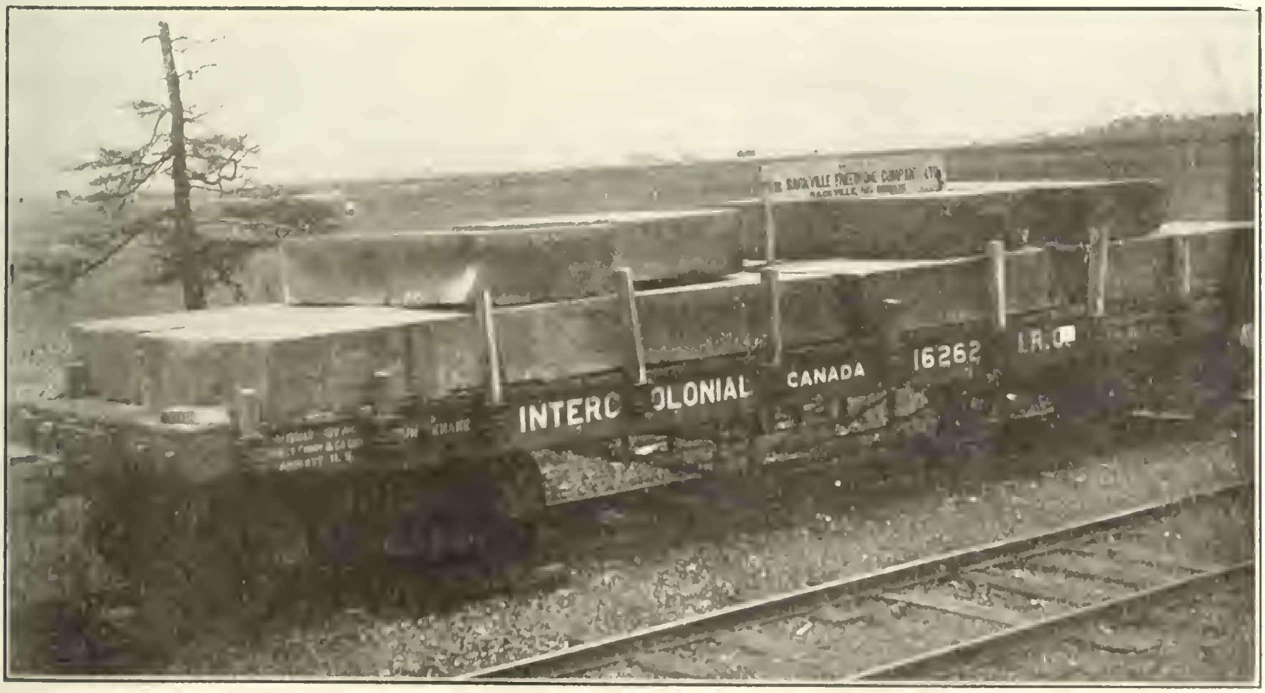

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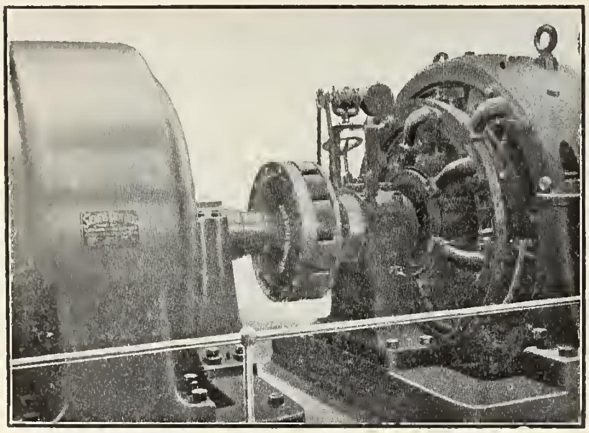

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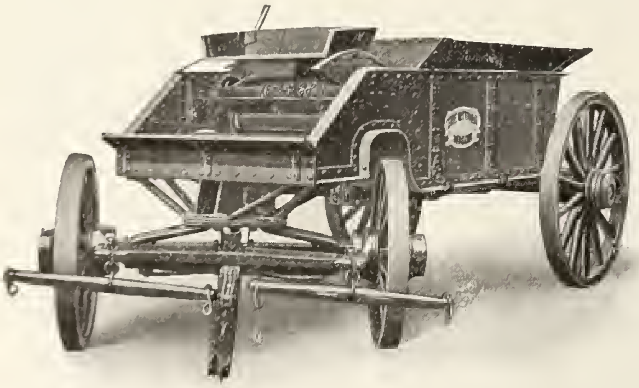

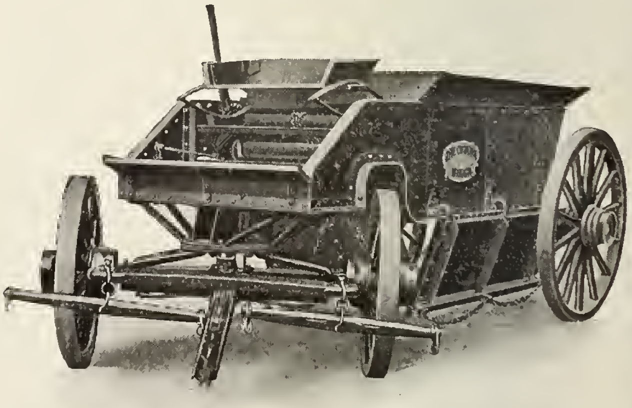

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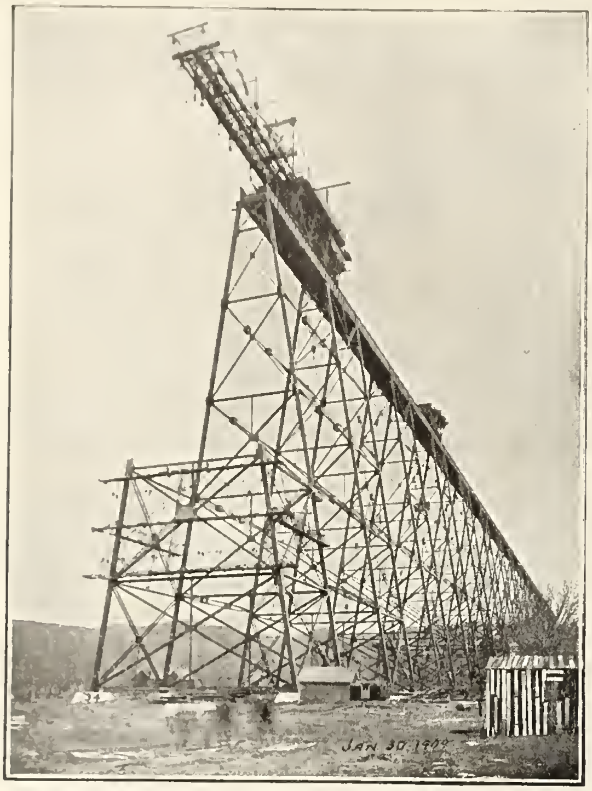

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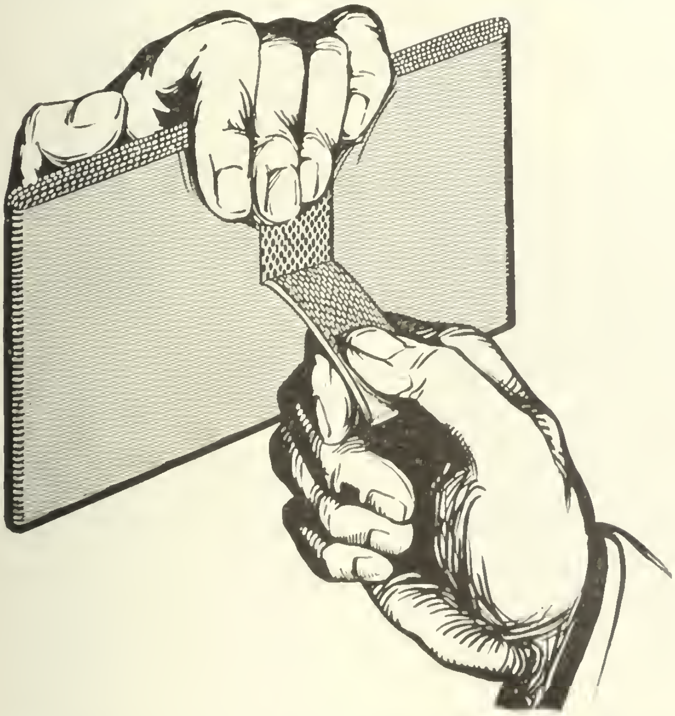

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are substantially constructed on a principal that has been proven by strenuous competitive tests to be the most sanitary and efficient.

The United States Government finally selected this type for the disposal of toilet refuse in its military camps and elsewhere, after trying every other apparatus on the market.

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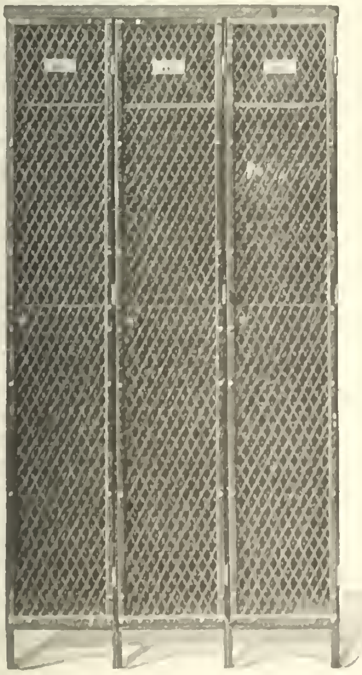

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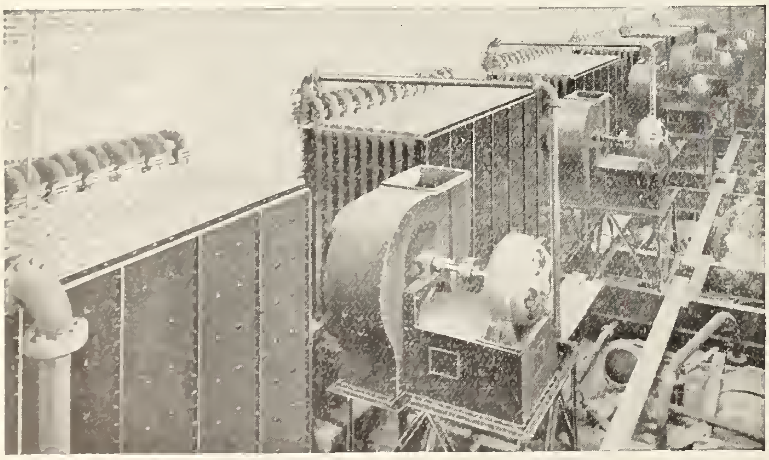

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Toronto Harbor Commissioners' Great Project

ELSEWHERE in this issue we publish details of the great improvement scheme the plans for which, prepared by Mr. E. L. Cousins, have been submitted by the Toronto Harbor Commission.

In prospect alone, such an undertaking, involving as it does the expenditure of nearly twenty million dollars, cannot fail to provide a great impulse to the city's commercial life, while looking to the actual consummation of the scheme the possibilities of development are practically unlimited.

After long years of apathy and failure to appreciate the possibilities afforded by Toronto's excellent natural harbor it is gratifying indeed that there could be found a body of men combining the knowledge and vision required to evolve an adequate and entirely satisfactory solution to the problem in the space of a few short months.

Every detail of the plans gives evidence of painstaking consideration, while the whole project, whether adopted in its entirety or not, will remain as a monumental inspiration on the part of those who devised it, reflecting the greatest credit upon the creative skill of the engineer. This is the second plan of great civic importance evolved by Mr. Cousins and it must be a matter of gratification to him that whereas from the first the tube system seemed destined to defeat, this incomparably greater project has awakened universal interest and aroused even a torpid public to a measure of enthusiasm.

With the commencement of active operations in the spring, Toronto will enter upon a new and greater era. With the facilities afforded and the provision made for co-operation between the railroad and shipping companies in the handling of freight, the name Toronto will loom large on the map not only of a great country but of a great continent.

We feel that we are one with our readers in expressing unqualified approval of an undertaking which, even in embryo, redeems Toronto from the charge of lack of foresight which must otherwise have been brought against her in the light of a comparison with the progress of other cities less favored naturally, but which in the past have given evidence of greater enterprise and a deeper sense of their duty to posterity.

As announced elsewhere, supplementary technical details of the Toronto Harbor Commissioners' plans will be published in our next issue.

Dr. Hodgetts, on Sky-Scrapers

THE need for placing a limitation upon the height of buildings was the subject of an interesting paper presented by Dr. Hodgetts, Medical Adviser to the Commission of Conservation of Canada, at the Seventh Annual Meeting of the Royal Architectural Institute of Canada, held last month at Ottawa (reported in the Contract Record of October 16, 1912). The speaker spoke strongly in condemnation of the modern "sky-scraper" and expressed the opinion that the growing tendency of Canadian cities to emulate the example of American cities in the erection of "freak" high buildings was a most deplorable one. It were more reasonable to expect sky-scrapers in the densely populated cities of Europe where land is scarce and more expensive than on this continent where, in comparison, there is no restriction to the growth of cities. The modern towers of Babel could only be characterized as the work of lunatics. Dr. Hodgetts said that he was discussing the subject from the standpoint of the sanitarian and in this light he found that the considerations which should govern were made subordinate to greed and gain. Factory design and construction in Canada had been improved but the buildings in which office employees worked were inferior to those erected ten years ago. The reason was that organized labor had rendered imperative the improvement of factories by judicious laws, while unorganized labor had been pushed to the back-ground by capitalists and architects. Every one of these unorganized laborers was entitled to adequate sunlight and fresh air. The speaker condemned strongly the buildings that were lighted daily by artificial light. Artificial conditions weakened and debilitated the worker. And moreover, the sky-scraper was a menace to light and air. Buildings should not be more than six or seven storeys in height and should occupy no more ground than would permit of adequate lighting and ventilating. The question was a sanitary and economic one, and the problem could only be solved by the co-operation of the various parties interested. Canada would be well advised to regard the example of the United States only as something to avoid and to enact laws in limitation of the height of buildings and in provision of the area of the lots built upon

As showing the manner in which the question had been dealt with in Europe, Dr. Hodgetts cited the examples of Frankfort, Dusseldorf, Mannheim and Cologne

In Frankfort, the town is divided into three districts: in the innermost one houses may be built 65 feet high, of five storeys, with not more than three-quarters of the site built upon; in the middle one the buildings are limited to four storeys, including basement, while in the outer one only three storeys are permitted—and only two where the streets are narrow.

In Dusseldorf, the height of the buildings is regulated by the breadth of the streets. In the inner town the building height is 63-66 feet, with four storeys, although, where the streets are wider, permits are issued for higher houses. In the outer town, buildings are restricted in height to 49 feet, divided into three storeys, and in the district of villa residences only two storeys are permitted. In this municipality, in the inner town, one-third of the building site must be reserved, the limit being one-half in the outer town, and in the villa district only two-fifths of the site may be covered.

In Mannheim, the requirements are very similar to those of Frankfort except that the provisions governing the area of the lot are rather more stringent.

In Cologne, buildings in the centre of the town may be five storeys with a mansard. In other portions of the town no building may rise over three storeys in height or occupy more than forty per cent. of its lot.

In Saxony, in the year 1900, such a scheme was made completely for all towns, while in various German communities houses must be so placed as to secure the maximum amount of sunshine.

Punishing Cities for Typhoid Outbreaks

COMMENTING upon the developments that attended the typhoid outbreak at Ottawa, the Engineering Record offers the following criticism:

"It is perfectly true that every year there are many deaths and far more cases of illness as a result of poor water supplies. It is also true that the greatest scourge of our time, consumption, could be greatly reduced by proper regulations rigorously enforced. The same is true of other diseases, although not to such an extent. It is both sad and exasperating to think of the many lives thrown away every year because of the carelessness of patients and their attendants. But there is another way to consider these matters. It was not long ago that the death rate from such diseases was far greater than it is to-day, while the visitations of typhus, cholera and other "plagues" a century ago filled everybody with dread. While we have a great deal to accomplish in the way of stamping out typhoid, it is not well to forget that we have accomplished a great deal. And the way in which it has been accomplished is unquestionably the right way to carry on the work. It is useless to pass laws and make regulations regarding public health until they can be enforced, and this is impracticable before public sentiment is ready to submit to the restrictions. Many cities have regulations prohibiting expectoration in public conveyances, railroad stations and the like, but they are not enforced, although it is known that the prevention of this habit will have an appreciable effect on the prevalence of consumption. What is needed is the education of the public to the importance of measures for the prevention of such communicable diseases. It will do no good to pass a law holding a city responsible for an outbreak of typhoid fever because the municipal water-works has furnished a contaminated supply. An enlightened public opinion will encourage the civic authorities to build works which will ensure a good water supply and to pass and enforce regulations to check consumption."

Attitude of Engineers towards Contractors in Engineering Work

ONE of the engineers in charge of a large portion of several million dollars worth of improvements at the New York end of an eastern railroad recently gave expression to the attitude of his road toward contractors as follows:

"We believe in giving our contractors a fair deal and letting them have a chance to live. In writing specifications we try to put ourselves in their places and only ask what they can give us and take special pains to make it very clear and definite. Obviously, we must know far better than the contractor what local conditions will be encountered, what traffic requirements will be necessary, what operating facilities will be available and what difficulties or advantages are to be anticipated. We give him this information as much as possible with the result that we uniformly receive lower bids.

"In bridge construction the largest economy possible is usually in erection, and we study the ground carefully and outline a satisfactory method of erection, which is described in the specification as available, with permission for the contractor to use any alternate method, provided it is first submitted to the engineer, who will approve it if it does not involve danger or loss to the railroad company. This method enables all the contractors to bid on a uniform basis of erection as well as fabrication. It also provides an opportunity for any of the bidders possessing special plant adapted for this particular work to make it available and offer a correspondingly lower bid, whereas if the use of this special plant had been specified it might resulted in a much higher bid if none of the other competitors were already possessed of the required equipment."

Often before the steel is shipped to the site the contractors are invited to a conference with the engineer to examine local conditions and lay out the most advantageous plan for handling the work, which often results in greater rapidity and economy.

In a recent case in point the contractor had a very expensive derrick car equipment on the ground for the reconstruction of several spans of a four-track through bridge. The traffic was maintained on two tracks of the old structure while half of it was replaced by the new one, and as the floors of adjacent tracks were supported by the same girders it was impossible to remove more than one track at a time, which made progress on the work very slow. To meet this emergency, the engineer offered to trestle the track, thus entirely releasing half of the old structure and enabling the new span to be erected in two shifts instead of four, provided the contractor would, without charge, remove the old structure, which he was not required to do by the terms of the specifications. This was agreed to, and with his expert force and facilities the engineer was able to trestle the track at an expense of not more than $200, much more cheaply than the contractor could have done it. The expense, moreover, was more than offset by the removal of the old structure by the contractor. At least two weeks were gained, the contractor saved several hundred dollars by the quicker release of his derrick-car plant and the railroad company saved in operating expense.

Large New Factory Building at St. John, N.B.

THE largest brush and broom factory in Canada and the first reinforced concrete building of mushroom construction in the Maritime Provinces has just been completed in St. John, N.B., for Messrs. T. S. Simms & Company and will be occupied by them during the month of December.

The structure was built in accordance with plans designed by the firm after a long series of conferences with the foremen in their present factory, the aim being to route the whole work of the plant in such a way as to save needless labor and produce the maximum of results in turning out the finished article. The architects were Lockwood, Greene & Company, of Boston, and the builders the Aberthaw Construction Company, also of Boston. Work was begun on April 18th and the roof was on by September 7th although the company lost 30 days during that time owing to the excessively wet season.

Reinforced Concrete Factory of Messrs. T. S. Simms & Company, St. John, N. B.

Considerable difficulty in construction was caused by the uneven character of the site, there being a difference of 21 feet between the highest and lowest point, the site being on the side of a saucer-like hollow adjoining the main road to Fairville. For example, in the front the concrete walk from the street enters the building two storeys up, while on the rear at one end the basement is level with the ground. This difference of grade made it necessary to construct a concrete roadway along part of the rear side in order to facilitate the movement of material in and out.

The factory is 400 ft. long and 50 ft. wide, with 4 storeys and basement. One of the chief aims was to secure light, and the walls of the building are 80 per cent. glass, there being no less than 25,000 panes in use. The whole factory is so designed that on each floor a 6 ft. aisle extends from end to end, with machines on either side. The mushroom construction, leaving the interior without girders, makes each floor present a very attractive appearance. In order to supply artificial light when needed there will be 800 tungsten lights from 40 to 150 watts. The only wooden floor in the whole building is over 200 ft. of the basement, and it is of mill construction with a hardwood top and resting on concrete girders. The object in placing a wooden floor there was to eliminate belts and the dust collecting system from the woodworking department overhead, and to make it possible to place the machines on that floor to the best advantage.

The factory has its own water supply. A well was sunk 301 feet, and there is a tank on the roof with a capacity of 40,000 gallons and a reservoir on the grounds holding 100,000 gallons. There is also on the roof a 10,000 gallon tank to supply the toilets in the building. There is a complete fire protection system, with hydrants and hose houses in the grounds, and a 1,000 gallon fire pump, besides a complete sprinkler system.

The power house shown in the photograph as partially completed, is constructed of hollow tile and is 69 x 46 ft. The dry kiln building is 62 x 52 ft. and two storeys high. The lower portion of this will be used as a varnish room and for storing handles. On the upper floor are six Grand Rapids kilns, separated by tiles. In these the lumber is saturated with steam vapor before drying. There is also a lumber shed, 100 x 56 ft., and 22 ft. high, with special facilities for handling the heavy hard wood lumber. From this shed the lumber will be run by machinery into the woodworking department, cut into blocks, sent down one side aisle into the dry kilns and out by another to the machines to pass on down through the various processes to the storing room for the finished product at the other end of the factory.

In the main factory there are two elevators and two stair towers, the latter being made fireproof. In the few fire partitions that are made in the factory steel lath and plaster are used. The whole of the interior of the factory is painted white with cold water paint, with green oil dados 5 ft. high.

The chimney of the plant is 150 feet high and is built of radial brick.

The work done on this factory by the Aberthaw

Construction Co. was a revelation to local builders because of the systematic way in which it was carried on. It was one man's duty to route the work so that no workman need waste time through lack of material. Another man had charge of the tools. The company had a modern plant for mixing concrete, turning out 20 cu. ft. every two minutes or less.

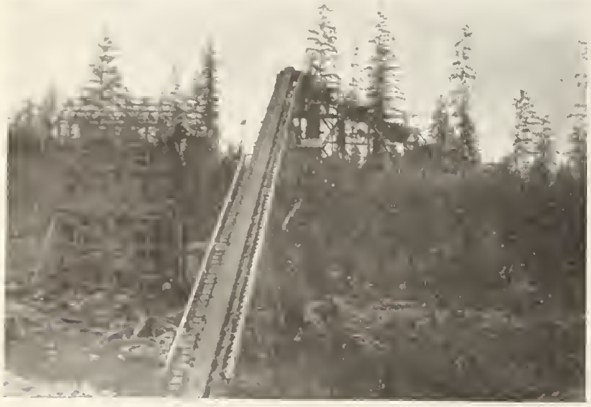
It is the intention of the Simms Company, a little later, after they have cleared up their grounds, and beautified them, to erect a welfare building for the benefit of their employees. They will begin work in the new factory with 260 employees but can double the number without increasing the size of the plant. The Canadian Pacific Railway runs past the plant and the products of the factory will be scattered over Canada to the Yukon, and south to the West Indies.

Modern Screening and Washing Plant in British Columbia

THE plant described herein consists of two branches, the producing and the distributing, the former being located near Coquitlam, seventeen miles east from Vancouver, and the latter on False Creek, in the city of Vancouver.

In the design and arrangement, the local demands received special consideration and although many gravel dealers brought the pit run to the machines at the city bunkers to be treated, it was decided that the place to treat the gravel was at the pit. The correctness of this decision has since proved itself.

The pit contains some 20 per cent. of stone too large for classification as gravel. It was therefore necessary to devise some means of disposing of it at slight cost or to put in an auxiliary rock crushing plant, and as of late the demand for crushed stone has been in advance of the supply it was decided to crush the big stones.


Constructional view of plant from pit bank

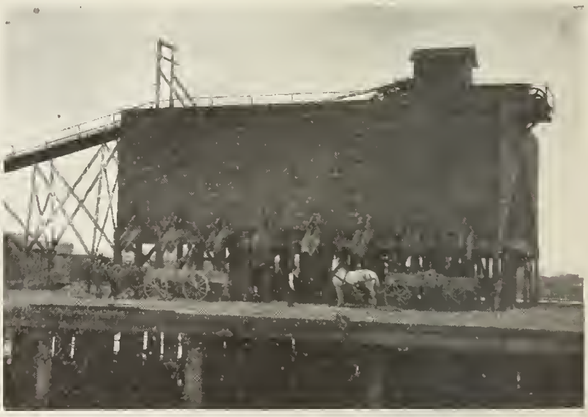

Team loading at the False Creek bunkers

Fig. 1 shows a plan of the railroad, gravel pit and pipe line from the river. Fig. 2 shows on a larger scale the general arrangement of the washing and crushing plants and their relation to the pit and dumping hopper, also the system of extension. Fig. 3 shows the plant in the city.

The railway gives shipping facilities to Vancouver and all other points. The spur to the pit is connected to a siding along the main railway line of 1,300 feet, also to a siding of 800 feet along the gravel company's line, so that empties and loaded cars may be easily changed and switched without any interference with the railway company. The length of the gravel company's line from the railway to the pit is 1.5 miles and is on their own right-of-way, the grade averaging 1.7 per cent., the maximum being 2 per cent. for a short distance at one place. With the loading, repairing and shovel tracks, there is a total of 11,300 feet of track.

The rolling stock consists of two dinky locomotives, 13 tons and 26 tons respectively, one 1½ yard Bucyrus steam shovel and 60 Hart convertible, centre bottom dump cars with a capacity of 30 yards each.

Owing to the difficulty of obtaining right-of-way on certain property, the line is somewhat sinuous but it is practically a surface line and was constructed cheaply.

The pit consists of a bank some 40 feet high above the general level which gives an ideal steam shovel working face, the deposit extending over some 160 acres.

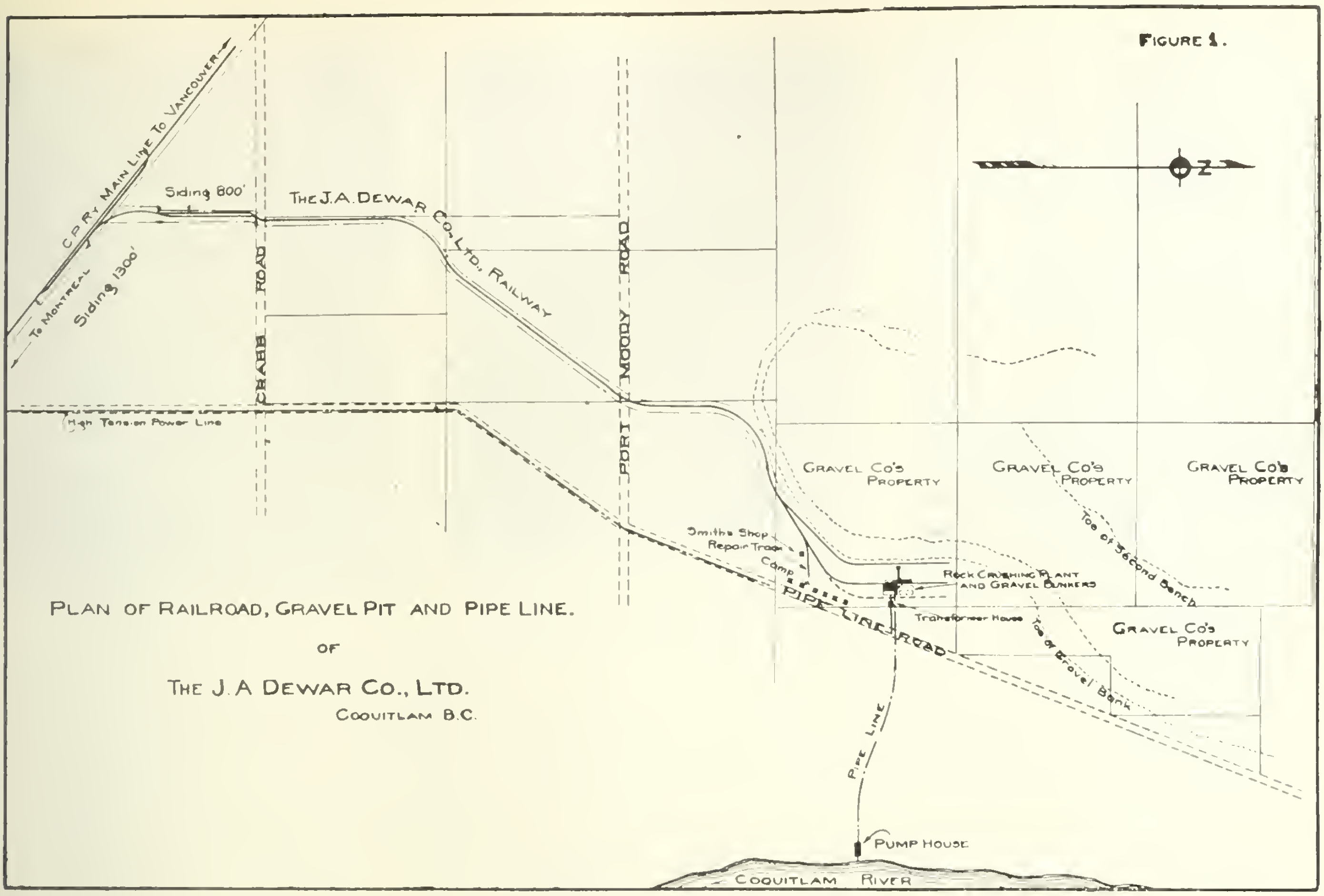
The method of operation is obvious from the layout. The steam shovel loads a 6-yard side dump car which is taken by the small locomotive to the grizzly, where the large stones are separated and discharged on to a small flat end dump car which takes them to the crusher. Below the grizzly is a hopper, discharging on to a 24-in. belt conveyor which carries the material to the screens.

The screening plant consists of four Gilbert screens, 36 in. x 54 in. x 6 ft. 0 in. (driven by a 15 h.p. motor), giving four separations 2 in., 1 in., ½ in., and sand. The sand passes through a gravity settling tank to remove the water. The rejections from the first screen pass by chute to the crusher. After being crushed they are elevated by a chain bucket elevator to the revolving rock screen which separates into three sizes, the rejections being passed back to the crusher for re-crushing.

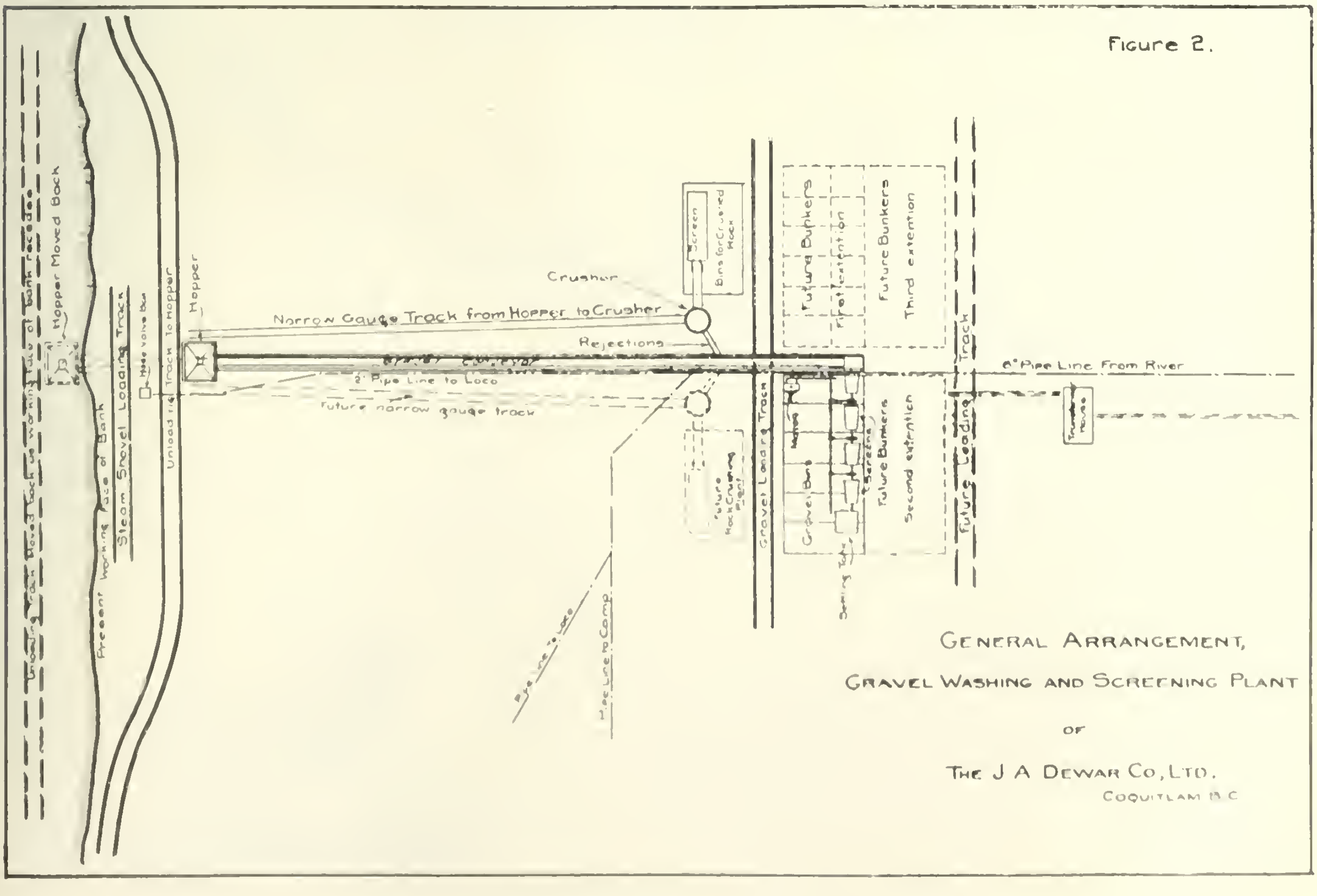
The bunkers are arranged to discharge into the cars on the loading track alongside, the cars being pushed in by the larger loop.

As will be seen from the plan, extensions may be made to any desired capacity and the machinery duplicated without alteration or interference with the present layout. The capacity is 500 yards of gravel and 200 yards of crushed rock per 10-hour day. On the plan is shown the order of extension up to 2,000 yards of gravel and 400 yards of crushed rock.

The water used by the plant for the boilers, camp, etc., is supplied by a three stage 4 in. centrifugal

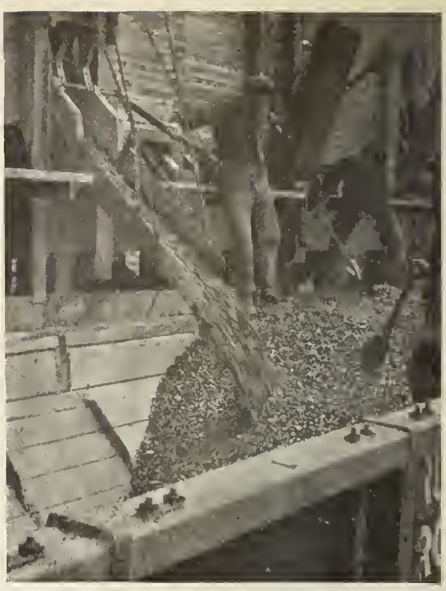


Modern Screening and Washing Plant in British Columbia



End view of gravel plant. Pile of stone rejected from gravel screen until operation of rock plant.

Looking down belt conveyer, showing unloading hopper and (on the right) corner of car spotter house.

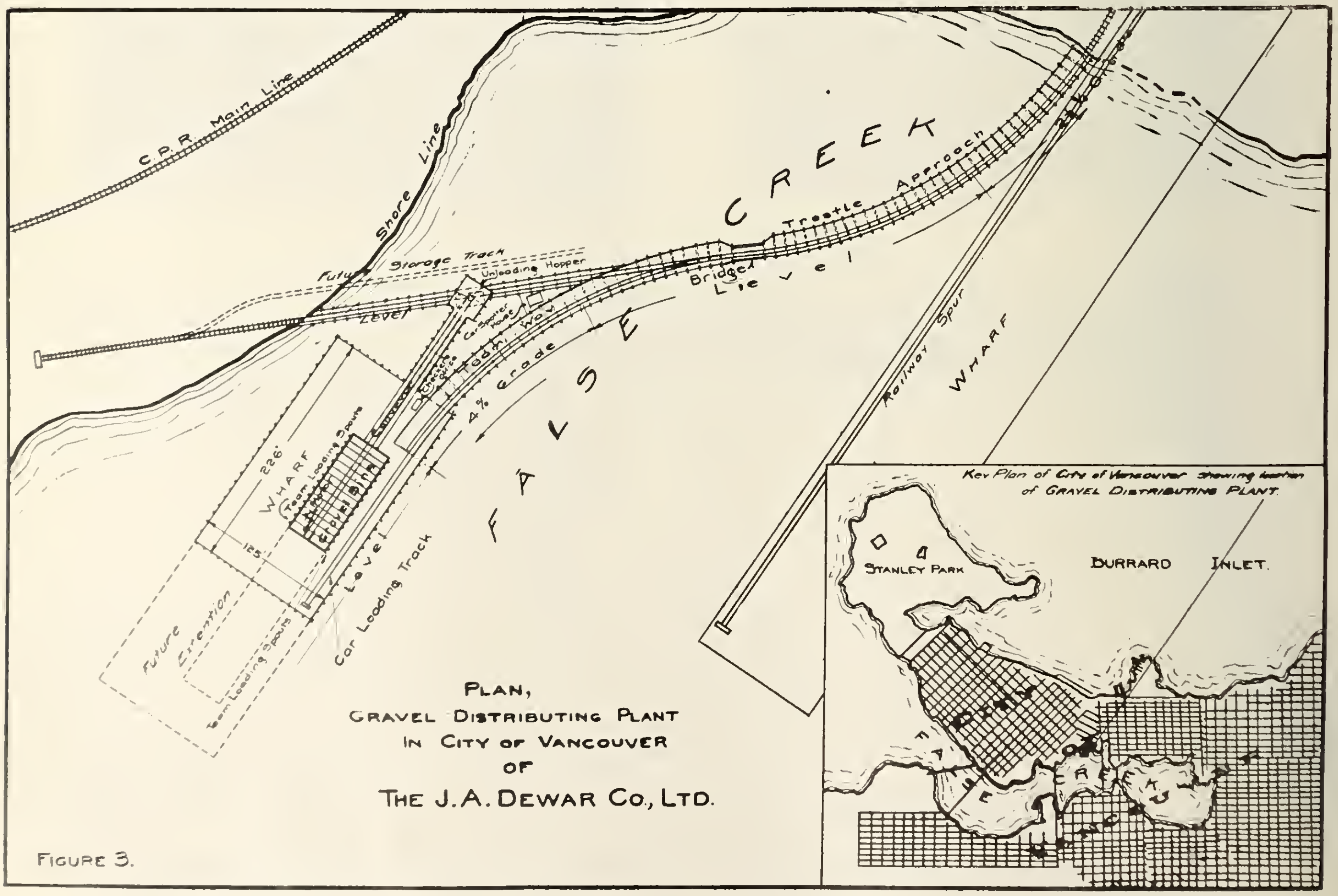


Hart cars being loaded at the pit for transportation to Vancouver and other points.

pump, located in the pump house at the Coquitlam river, a distance of 3,300 feet and is driven by a 35 h.p. motor. The wiring is arranged so that the motor must be started from the pump-house but may be shut down from the camp if necessary. The pipe line is a 6 in. wood pipe.

Power is supplied by the B. C. E. Railway Company, at 2,200 volts, to the transformer house where it is stepped down and fed through the switchboard to the several motors and lighting circuit at 220 volts.

The distributing branch is located exceptionally well for local deliveries, it being right in the heart of the city of Vancouver. The trestle as shown in Fig. 3, has a grade of 2.5 per cent. on the approach to obtain headroom for the scows underneath bridge and for discharging hopper. The cars of graded gravel are placed over the hopper and discharged, the hopper having the capacity of one car. While the car is being moved and the next one spotted, the gravel has passed out of the hopper to a 24-in. belt conveyor which conveys it to the bunkers and dis-



Plan, Gravel Distributing Plant in City of Vancouver of The J. A. Dewar Co., Ltd.

Figure 3.

charges by tripper into the respective bins. The cars are placed by the C. P. R. switching engine at the top of the approach trestle from which point they are spotted by a motor driven car haul. Trackage is provided along one side of the bins so that gravel may be shipped from the bunkers by street railway or other cars if required.

The bin storage capacity is 1,200 yards and is arranged for team delivery. Here, again, the capacity may be increased without much alteration to the present layout, the only change being an extension to the belt conveyor and moving the conveyor head drive as the bunkers extend.

Although in two branches, the plant easily competes with the scow delivery usual in Vancouver, it being greatly favored by the non-liability of being held up by fogs or storms.

An interesting feature at both branches of the plant is the crib type of construction for the bins, which, though not reducing the B.M. of lumber in the structure, yet allows a cheaper class of labor to be employed and requires less time for construction.

The gravel company own their own rolling stock as mentioned, also telephone system and camp. They erected the Westminster Junction plant by day labor but built the Vancouver branch by contract.

The owners are The J. A. Dewar Company, Limited, of 429 Pender street, Vancouver. Mr. S. A. Lake of Wilson, Lake & Bentall, consulting engineers, 422 Pacific Building, Vancouver, designed and superintended the erection of the plant.

This gravel plant has been in operation 1½ years and is giving every satisfaction, both commercially and mechanically. Eighteen men are employed, including superintendent, at the pit, and two men, including checker, for the teaming at the city branch. The unloading at the city end is stated to be the most efficient and economical in Vancouver.

Depositing Concrete Under Water

Methods of depositing concrete under water have been studied during the past year by the committee on masonry of the American Railway Engineering Association, and certain conclusions on this subject are presented in its report on the basis of replies to a circular sent to a large number of railroads.

It is found that the methods of depositing concrete included in the replies were: Botton-dump bucket, tremie, sacks, paper bags, open chutes, open depositing, pneumatic grouting or broken stone and concrete blocks.

The committee makes a series of observations in regard to general practice in this matter, which are substantially as follows:

Concrete may be deposited successfully under water, if so handled as to prevent the washing of the cement. Cofferdams should be sufficiently tight to prevent current through the pit, and the water in the pit should be quiet.

The concrete should be deposited in place either by means of a drop bottom bucket or a tremie, and should not be allowed to fall through the water. Where a bucket is used, it should be carefully lowered to the bottom and raised to the surface, so as to cause as little disturbance as possible of the water. Where a tremie is used, it should be kept filled with concrete up to the top of the water level, and the discharge end should be kept buried in the freshly deposited mass to prevent emptying, and raised a few inches at a time as the filling progresses. The surface of the concrete must be kept as nearly level as possible to avoid the formation of pockets which will retain laitance.

Where concrete is not deposited continuously, all sediment should be removed from the surface of the concrete, by pumping or otherwise, before depositing fresh concrete. The concrete should be a 1:2:4 mixture and of a quaking consistency. Freshly deposited concrete should not be disturbed.

Where the flow of water through the pit cannot be prevented, concrete should be deposited in cloth sacks.

Cement Lining for Steel Pipes on the Catskill Aqueduct, New York City Water Supply

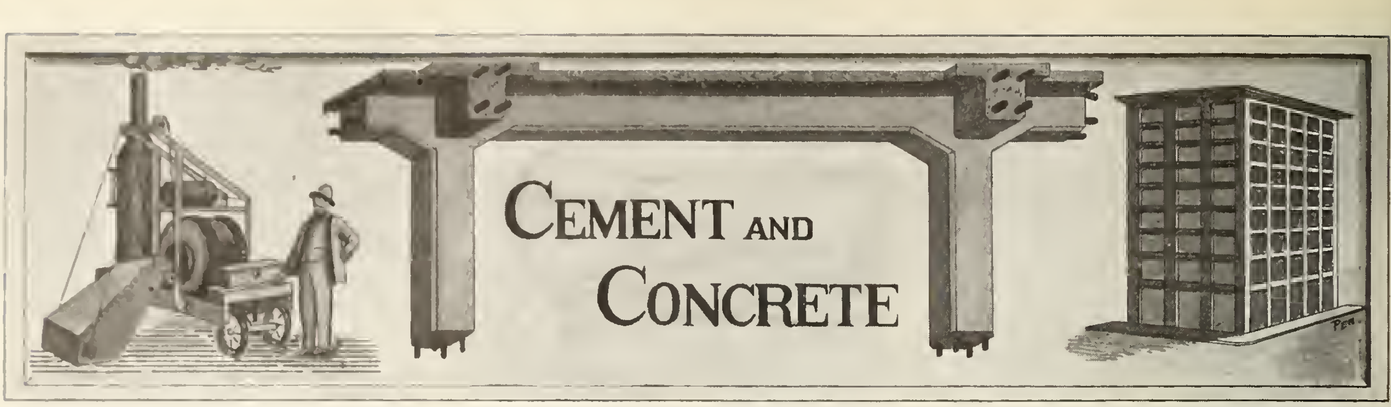
At a meeting of the New England Water Works Association, Mr. Alfred D. Flinn, Department Engineer, Board of Water Supply, New York City, read a paper entitled, "Protection of Steel Pipes in Catskill Aqueduct," describing the lining of some 33,000 ft. of steel pipe with cement.

Steel having been selected as the metal for the pipe plates, attention was directed to the best method of protecting it. Reports of experience from many places and special examinations of many steel pipe lines of varying ages gave convincing proofs that none of the pipe coatings commonly used was possessed of qualities giving it more than a few years' useful life. One or two cases of use of Portland cement mortar on a small scale in pipes and wide experience in reinforced-concrete construction of the protective action of the cement on the steel pointed to a method for coating the pipes. After some study it was decided to jacket the steel siphons of the aqueduct outside with rich concrete mixed about one part of cement to three parts sand and six parts broken stone or gravel, with a minimum thickness of 6 ins., and to line them with Portland cement mortar, 2 ins. thick at the minimum.

For lining the pipes, two dictinctly different methods have been adopted by the two contractors; on Contract 62 grouting with forms has been employed, and on Contract 68 mortar has been applied by means of the "cement gun." In this particular work grouting proved to be more economical and the "gun" has been discontinued.

It is hoped that these pipes will last a hundred years; they may last much longer, barring accidents. Some abuse or unappreciated condition may lead to earlier partial failure, necessitating reconstruction. The gain in smoothness of interior by covering the rivet heads and the plate laps has been computed to so increase the hydraulic capacity that three pipes equal four without lining. The total cost for the siphons with three lined and jacketed pipes is estimated as about the same as for four pipes constructed and coated in the more usual way. Obvious incidental advantages are secured by the more permanent construction

According to the regulations covering concrete construction adopted by the building superintendents of Greater New York, the compression on the concrete in reinforced concrete columns may be increased 20 per cent. when the fine and coarse aggregates are carefully selected and the proportion of cement to total aggregate is increased to 1 part of cement to not more than 4½ parts of aggregate, fine and coarse, either in proportion of 1 part of cement, 1½ parts of sand and 3 parts of stone or gravel, or in such proportion as will secure the maximum density.



Reinforced Concrete Construction—1

By Professor E. Brown,
Department of Civil Engineering, McGill University, Montreal

The first of a special series, written exclusively for the Contract Record and Engineering Review

THE development of reinforced concrete construction has been one of the most remarkable features of engineering science in recent years. In the earlier stages of this development, actual construction more than kept pace with careful experimental work on which the principles of design must be based, and there were as many formulae for design in the field as there were rival methods of reinforcement. The rush of laboratory experimental work has subsided somewhat, so that we can form a calmer judgment on its value and applicability, and the great school of practical experience has taught many things which have their influence on success in construction work, and on the trend of ideas in design. The result has been that we have emerged from a period in which many designers used many methods, frequently complicated, to a period when the broad underlying principles of design are, in the main, firmly established. Simplicity has become the keynote of design, and it is the purpose of these articles to explain in as simple a manner as possible the scientific basis of our construction work, to show to what extent the main assumptions of design accord with the results of tests, and to give some numerical examples of actual design in illustration of the principles explained.

Nature of Materials Used

Concrete is a material of a permanence resembling that of stone, having a high compressive strength, and being capable of taking the shape of any mould into which it is poured. It has the advantage of cheapness, and can be handled by unskilled labour under proper supervision. It has, however, a low tensile strength, and for this reason a beam of plain concrete would carry very little load. To make concrete an economic possibility in the form of a beam, some material must be embedded in it capable of resisting tensile stresses, of bonding properly with the concrete, and of undergoing changes of temperature with the concrete in which it is embedded without producing internal straining action in the structure. For it must be remembered that if a beam, for example, be subjected to a rise in temperature of say 100°, the concrete and the embedded material will change in length. If the embedded material would, when free, change in length by a different amount from the change of the same length of concrete, then, when embedded, there must be internal straining actions set up even if the beam carried no external load. Steel and concrete, however, expand or contract about equally under change of temperature and hence no such straining actions are set up. Steel is, moreover, one of the commonest forms of structural material, can be purchased cheaply in a great variety of forms, has a high tensile strength, and bonds well with concrete. It is, therefore, on all grounds an admirable material for the reinforcement of concrete.

Physical Characteristics of Materials

The two characteristics of importance are (a) strength, (b) deformation under load.

Steel.—In the case of steel an elastic limit of from 30,000 to 36,000 lb./sq. in. may be depended upon if the steel be mild, while if it be higher carbon steel, such as is sometimes used in reinforcement, the elastic limit may be from 50,000 lb./sq. in. up, dependent upon the carbon content. The former steel is ductile while the latter is more brittle. It is a well-known property of steel that when carrying a load in simple tension or compression, a specimen will undergo a change of length which is directly proportional to the load, provided the elastic limit is not exceeded. This is known as Hooke's Law and may be stated thus:—

Let P lb. = total pull or push uniformly applied to a specimen of cross section A sq. inches.

L = length of specimen in inches.

C = change of length of specimen in inches.

Then $\frac{P}{A} = f =$ stress intensity in lb./sq. inch.

$\frac{C}{L} =$ change of length per unit length = strain

$$\frac{\frac{P}{A}}{\frac{C}{L}} = \text{constant within elastic limit.}$$

The constant is known as the modulus of elasticity (E).

Therefore stress intensity f = E . strain.

From this law the deformation of steel under working loads can be calculated, for it is found that E varies very little from 30 x10^6 lb./sq. in. for all steels used in ordinary practice. Hence a piece of high carbon steel and a piece of milder steel, when loaded to a given stress intensity will have the same strain i.e., it will deform by the same amount over a given length. Thus, if a length of 10″ of a tension bar be considered it would be found that when f = 30,000 lb./sq. in., the strain would

$$\text{be } \frac{f}{E} = \frac{30{,}000 \text{ lb./sq. in.}}{30 \times 10^6 \text{ lb./sq. in.}} = \frac{1}{1000}$$

This means that the bar would stretch by $\frac{1}{1000}$ of 10″, i.e., by $\frac{1}{100}$″. If f were only 10,000 lb./sq. in., one-third of the above value, the stretch would be one-third of $\frac{1}{100}$″ and so on. This law holds good within the elastic limit only. It may be said, therefore, that the deformation of steel under load can be forecasted definitely since E is practically constant for all steels; but as regards strength, the nature of the steel, whether mild or high carbon, and its previous history, must be known before any estimate can be made.

Concrete.—The case of concrete is quite different from that of steel in respect to its deformation under load, for this characteristic is just as irregular as it is regular in the case of steel. If a 10″ cube of good rock concrete were placed in a testing machine and loaded in compression from 0—25,000 lb., i.e., with a load of 250 lb./sq. in., an approximate measurement made with callipers might show a shortening of about $\frac{1}{1000}$″ This would mean a strain of

$$\frac{\frac{1}{1000}}{10} = \frac{1}{10{,}000}. \quad \text{Hence since } E = \frac{\text{stress}}{\text{strain}}, \; E = \frac{250}{\frac{1}{10{,}000}}$$

$$= 2.5 \times 10^6 \text{ lb./sq. in.}$$

It might equally well be found that a similar specimen would shorten by perhaps $\frac{1}{1200}$″, corresponding to E = 3x10^6 lb./sq.in., or by $\frac{1}{800}$″ corresponding to E = 2 x 10^6 lb./sq.in. This means that the value of E for concrete is not a definite quantity. Such a measurement made with callipers between the loading faces of the testing machine would, however, be an approximate one only, and if extensometers capable of reading to $\frac{1}{100{,}000}$″ were placed in various positions on the four sides of a cube they would, in all probability, show different amounts of yielding on the faces, so that any calliper measurement would be an average value.

Further, if the compression load be increased from 25,000 to 50,000 lb., making the stress intensity 500 lb./sq. in. instead of 250 lb./sq.in., it would probably be found that if the first 25,000 lb. shortened the cube by $\frac{1}{1000}$,″ the second 25,000 lb. would shorten it by a little more than $\frac{1}{1000}$,″ say by $\frac{1}{980}$″ perhaps. An additional 25,000 lb. might shorten it more again, say by $\frac{1}{900}$″, and so on, until assuming the ultimate load carried to be 200,000 lb. the last 25,000 added might shorten it by $\frac{1}{700}$″. This means that the modulus of elasticity of concrete in compression diminishes as the stress intensity increases. **There is no direct proportion between load and deformation up to an elastic limit, as there is in the case of steel.** Values of E can only be calculated by regarding the effect of successive increments of load as above. Good rock concrete, for example, might show an initial modulus of 2.5 x 10^6 lb./sq.in. decreasing to 1.5 x 10^6 lb./sq. in. at failure, or an initial value of 2.0 x 10^6 decreasing to 1.3 x 10^6, or any such similar values within fairly wide limits. **There is no definite value for the initial or final value of the modulus, nor is there a definite law of variation between any such limits.**

On the other hand, with good materials and proper supervision, a rock concrete, say 1-2-4, can be made which at 28 days will develop with certainty from 2000 to 2500 lb./sq.in. The strength of the concrete can be depended upon, but the modulus is a very variable quantity. It will be shown later that the variations of modulus are of little importance in a design. The modulus varies most for stresses beyond those usual in practice, and it matters but little whether its value be assumed to be two or three million pounds per sq. inch.

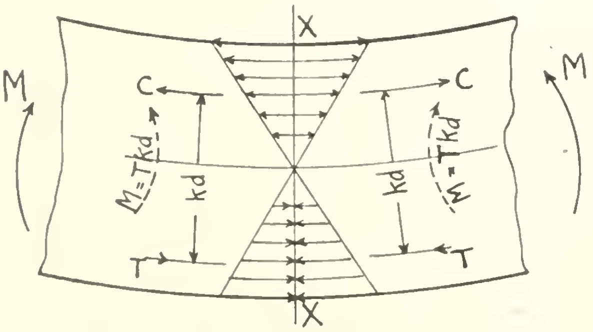


Fig. 1—Internal Action in a Homogeneous Beam

Internal Action in a Beam

In a beam of one homogeneous material, such as steel, the internal action is shown as in Fig. 1. An external bending moment M bends the beam, and any section, such as XX, normal to the length of the beam, cuts through compressive and tensile forces indicated by the arrows, tensile tressess being represented by arrows drawn towards each other. These prevent the beam from tearing open across XX. There is some neutral plane separating tensile and compressive stress areas, and the stress intensity at any longitudinal layer varies directly as the distance of the layer from this plane. Considering the internal stresses to the right of XX, they are equivalent to some single resultant compression force, say C, and a single resultant tensile force T. These forces are of equal magnitude, since the application of a bending moment or couple M must be balanced by a couple only. C and T, acting at a distance kd apart give rise to a couple = Tkd in the clockwise direction shown by the dotted arrow. kd is some fractional part of the total depth d. This couple balances the external M to the right of XX, which is counterclockwise, so that M = Tkd. Similarly, the external couple M to the left of XX is balanced by the internal stresses indicated by arrows to the left of XX.

The action in a reinforced beam is similar to this, only that the tension stresses, instead of being spread over a considerable portion of the cross section, are localized in the reinforcing bars, and the compressive stress intensity in the concrete does not follow the linear law of variation as closely as it does in a homogeneous beam. The action may be understood from Fig. 2. Experiment shows that the change of length of various layers of a beam subjected to a bending moment M is represented fairly closely by the ordinates from a straight line AF to a straight line BE, i.e., the extreme layer in compression shortens by AB, a layer nearer the neutral surface shortens by CD, while the steel stretches by GH. Thus, if the measurements were made over a length of 10″, AB might be $\frac{1}{750}$″ and CD would be half of this, viz., $\frac{1}{1500}$″, if OC = ½OA, i.e., the deformation is proportional to the distance from O. If the material had a constant modulus, the stress at any layer would also be proportional to its distance from O. But as we have seen, the modulus is less the greater the deformation, and possibly it might have a value 2.5 x 10^6 lb/sq.in. for the deformation CD, and only 2.3 x 10^6 lb/sq. in. for the deformation AB. This would give:—

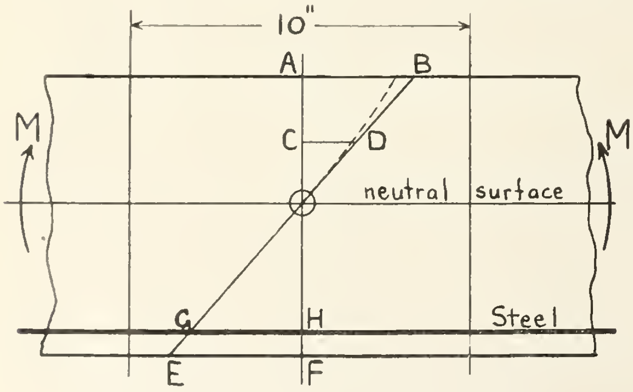


Fig. 2—Deformation of Reinforced Beam

$$\text{stress at CD} = \text{strain at CD} \times 2.5 \times 10^6$$

$$= \frac{\frac{1}{1500}'' \times 2.5 \times 10^6}{10''} = 166.7 \text{ lb/sq. in.}$$

$$\text{stress at AB} = \frac{\frac{1}{750}'' \times 2.3 \times 10^6}{10''} = 306.7 \text{ lb/sq. in.}$$

The compression stress is, therefore, not doubled by doubling the distance from the neutral surface, and the stress intensity is represented by the ordinate from OA to such a curve as is shown dotted. Thus the internal forces or stresses resisting the compression, as shown in Fig. 3, are equivalent to resultant force C, and the internal stress in the rod is represented by the forces T. Hence, if the position of the force C can be determined, the distance kd between C and T is known. Since C = T, the moment of the internal stresses = Tkd = external moment M. The couples Tkd to right or left of XX are each opposed to the external M to right or left of XX, and balance it.

Development of Beam Formulae

The object of any beam formula is to determine the quantity kd above, since, if that is known, the capacity of the beam to resist bending is given by multiplying the safe pull in the steel by this length kd.

In the earlier stages of experimental work on reinforced beams, writers took account of the effects of the variable modulus of concrete as explained above, and produced formulæ which were very cumbersome in actual use. They departed from the simplicity of the formula for homogeneous beams, and undoubtedly proved a handicap to many who sought for clear ideas on the design of reinforced concrete structures. These elaborations were very unjustifiable. They were based on two main assumptions:—

(1) that the layers of a reinforced concrete beam are deformed by amounts which are proportional to their distance from the neutral surface;

(2) That for any given concrete there are well defined limiting values for the modulus of elasticity and a definite law of variation of modulus between those limits.

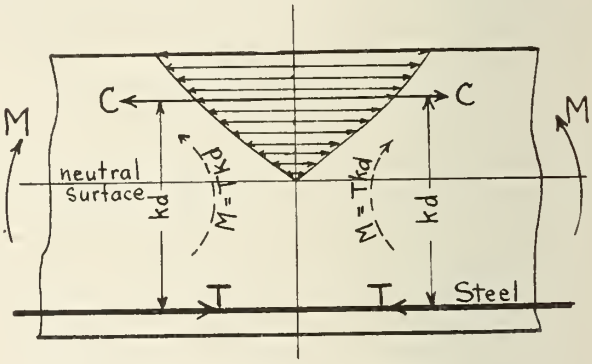


Fig. 3—Internal Action in a Reinforced Beam

Neither of these assumptions is rigidly true, especially the latter one. The first is very frequently true, and experiment reveals only slight departures from it in some cases. But before urging the adoption of complex formulæ based on the variable modulus of concrete, the earlier experimentalists and writers should have considered the vital question as to whether their elaborate theoretical analysis produced any important changes in the leading dimensions of a design from those which would be given by a simpler analysis. It has come to be recognized that this is not the case, and in the past three or four years standard specifications have adopted the simple treatment which is explained in what follows. The facts now generally admitted are these:—

(a) That with proper care, concrete can be made of a compressive strength to be depended upon,

(b) That the precise values of the modulus of elasticity for any given concrete are not definite, nor is there a definite law for their variation.

(c) That considerable variations in the modulus affect but slightly the leading dimensions of a design, and in the absence of certain knowledge of its value, a value may be chosen which will be on the side of safety.

The extent of the influence of the above facts on the beam formula will now be shown.

Derivation of the Beam Formula—Resistance offered by a Beam to Bending.

The assumptions made in developing the formula for the resistance to bending are:—

(1) That the beam is initially straight, and that parallel plane transverse sections, perpendicular to its length when the beam is unloaded, remain plane when the beam is bent but become inclined towards each other. The effect of this has been explained above.

(2) That the beam is subjected to bending only. The effect of shearing will be considered separately.

(3) That within the limits of stress in practice the modulus of elasticity of concrete is constant, so that the compression stress intensity in the concrete increases from zero at the neutral surface to a maximum at the outermost layer according to the straight line law.

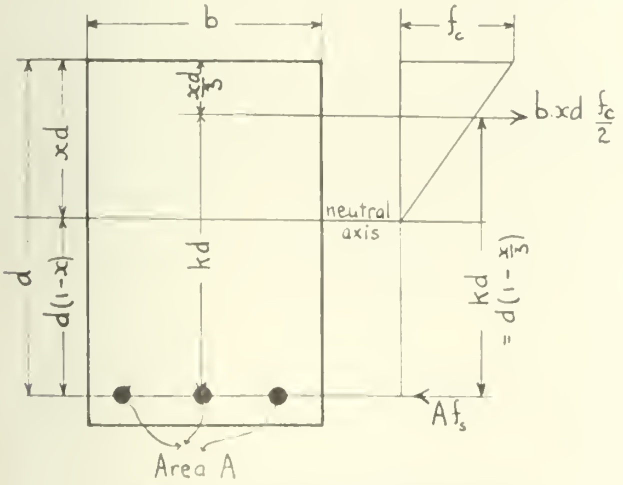


Fig. 4 Reinforced Rectangular Beam

(4) That all the tension is carried by the steel.

(5) That the concrete and steel stretch together, i.e., that the bond is effective for stresses within the elastic limit.

Case of Rectangular Beam

(See Fig. 4)

Let b = breadth of beam in inches

d = depth of beam in inches to the centre line of steel

xd = depth of beam in compression

f_c = greatest compressive stress in concrete in lb/sq. in.

f_s = tensile stress in steel in lb/sq. in.

E_s = Young's Modulus for steel in lb/sq. in.

E_c = Young's Modulus for concrete in lb/sq. in.

$\frac{E_s}{E_c} = c$ = ratio of moduli of steel and concrete

A = sectional area of steel in sq. inches.

$p = \frac{A}{bd}$ = percentage of reinforcement

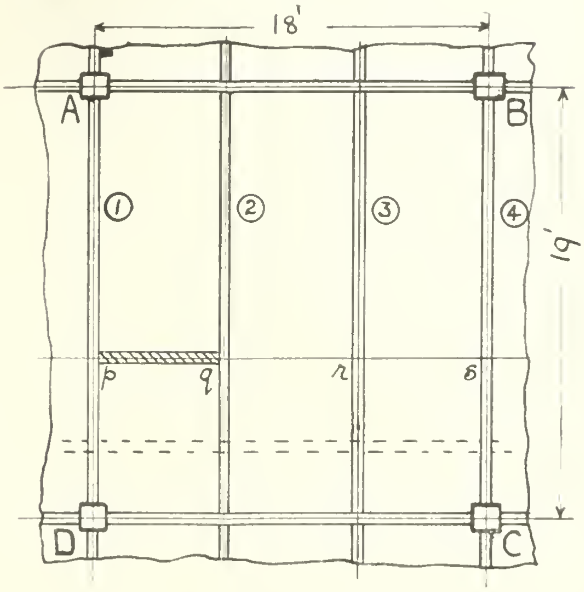


Fig. 5—Reinforced Floor Unit

The position of the neutral line is then located as follows:—

(a) The total tension in the beam = total compression.

$\therefore Af_s$ = tension in steel = area in compression . average compressive stress = $bxd.\ \frac{f_c}{2}$

$$\text{or } \frac{f_c}{f_s} = \frac{2A}{bd.x} = \frac{2p}{x} \qquad (1)$$

(b) $f_c = E_c$. strain at furthest layer in compression

$f_s = E_s$. strain at steel layer

$$\therefore \frac{f_c}{f_s} = \frac{E_c}{E_s} \cdot \frac{\text{strain in furthest layer in compression}}{\text{strain at steel layer}}$$

$$= \frac{E_c}{E_s} \cdot \frac{x\ d}{(1-x)\ d} = \frac{x}{c(1-x)} \qquad (2)$$

Equating the values of $\frac{f_c}{f_s}$ given in equations (1) and (2)

$$\frac{2p}{x} = \frac{x}{c\,(1-x)}$$

or $x^2 + 2pcx - 2pc = 0$, a quadratic equation the solution of which is,

$$x = \sqrt{p^2c^2 + 2pc} - pc \qquad (3)$$

Bending Moment

The bending moment resisted = tension force . kd =

$$= Af_s\ .kd = Af_s\,d\,(1 - \frac{x}{3}) \qquad (4)$$

These formulae enable any problem on bending to be solved.

Equation (3) gives the position of the neutral line for any percentage of reinforcement p, and for any ratio of moduli c. Thus, if the modulus of elasticity of concrete is 2×10^6 lb/sq. in. so that c = 15 (E_s being 30×10^6 lb/sq. in.), the equation gives for p = .01, i.e., 1% reinforcement.

$$x = \sqrt{(0.01)^2 x 15^2 + 2x0.01x15} - 0.01x15$$

$$= \sqrt{0.3225} - 0.15 = 0.569 - 0.15 = 0.419$$

This means that the neutral surface is at a distance 0.419 of the depth of beam from the extreme compression layer.

The following table shows values for x calculated as above:

p	VALUES OF x.	
	$E_c = 2x10^6$ lb/sq. in. c = 15	$E_c = 3x10_6$ lb./sq. in. c = 10
0.007	0.365	0.311
0.010	0.417	0.358
0.015	0.483	0.418
0.020	0.530	0.463

These figures show that the greater the percentage of reinforcement the lower the neutral axis. They also show how little is the influence of a large variation in the modulus on a design. For, taking a beam 6″ wide, 10″ deep to steel, and having 1%, i.e., 0.6 sq. in. of reinforcement. If $E_c = 2x10_6$ lb/sq. in. the neutral axis is 4.17, or say 4.2″, from the extreme compression layer, while if the modulus is $3x10^6$ lb/sq.in. the distance becomes 3.58″, or say 3.6″. Hence the centre of compression is $\frac{4.2}{3} = 1.4''$ in the former, and $\frac{3.6}{3} = 1.2''$ in the latter case, from the extreme compression layer. The lever arm, kd, is (10 − 1.4) = 8.6″ in the one case, and (10 − 1.2) = 8.8″ in the other case. If the steel stress is 16000 lb/sq. in., the steel force = 0.6x16000 = 9600 lb. in each case. The resisting moments are, therefore,—

9600x8.6 = 82600 inch lb. if $E_c = 2x10_6$ lb/sq. in.
and 9600x8.8 = 84450 inch lb. if $E_c = 3x10_6$ lb./sq. in.

The difference is trifling, and no one having the slightest acquaintance with the conditions in which concrete work is carried on will contend that in practice a distinction can be drawn between a lever arm of 8.6″ and one of 8.8″. Errors of magnitude far greater than this difference will inevitably arise in the placing of the rods. Since this is the case, it matters little whether E_c is taken at two or at three million pounds/sq. in. But as the value of $2x10^6$ gives the **smaller** lever arm, and hence a greater force to resist a given moment, it is usual to take $E_c = 2x10^6$, for this will necessitate a trifle more steel than if $E_c = 3x10^6$. The problem of the variable modulus of concrete is thus easily disposed of. Large variations in the modulus matter but little, and we choose a low value rather than a high one, as this is on the safe side.

Reinforcement of Floor Slabs

The foregoing principles will now be applied to the calculation of the reinforcement necessary in a floor slab having steel running in one direction. Whether Kahn, plain, or twisted rods, or steel mesh is used is immaterial to the general principle. The following ideas and calculations form the basis of any of the tables of reinforcement issued for the information of those engaged in this class of work. Sketches of particular methods follow the general calculations.

One of the most common methods of laying a concrete floor is as shown in Fig. 5.

A, B, C, D, represent four columns of a unit measuring say 18 ft. x 19 ft. Tee beams (1), (2), (3), (4) are spaced 6 ft. c. to c., their ends being supported either at the columns or on the 18ft. cross girders joining A and B, and C and D. The design of the Tee beams will be considered later. The floor slab itself is reinforced by placing some form of reinforcement running parallel to the 18 ft. girders. The function of this reinforcement can be seen from Fig. 7.

Let the floor be required to carry 250 lb/sq. ft. in addition to its own weight. Make an estimate of the weight by assuming that concrete and steel together weigh 150 lb/cu. ft. If the slab is about 4″ thick (a reasonable value) it would weigh 50 lb/sq. ft. The total load would then be 300 lb/sq. ft. Consider a strip of floor pq (Fig. 5) 1 ft. wide, 6 ft. long. It carries a load of 1800 lb., and if it **merely rested** on the supporting Tee beams at p and q **with its ends free,** the bending moment at p and q would be zero and at the centre of the span would be

$$\frac{\text{load W x span l}}{8} = \frac{1800x6x12}{8} = 16,200 \text{ inch lb.}$$

The curve of bending moment would be a parabola (Fig. 6). But the floor slab has a certain amount of continuity over the girders. Instead of a series of separate beams of 6 ft. span sagging as shown by dotted lines, the curve assumed by the panel will be as shown by the full lines (Fig. 7). There is a constraining moment m inch lb. at each Tee beam acting as shown, and this reduces the bending moment in the floor slab by that amount at each section. Hence, if a base line p′ q′ be drawn in Fig. 6 at a distance m from pq, the ordinates shaded show the bending moments in the slab. This construction evidently reduces all the bending moments when ends are free, by the amount m. There are two points CC (Fig. 6) where there is no bending moment, and the pieces PC, QC really act as cantilevers, supporting the central piece CC, which is in the same condition as if freely supported at its ends.

While such continuity undoubtedly exists, the exact value of m is uncertain. The moment required to constrain the ends of a beam with uniform load so that they may pass horizontally over the supports $= \frac{Wl}{12} = m.$

This would leave a central moment of $\frac{Wl}{8} - \frac{Wl}{12} = \frac{Wl}{24}$. The greatest moment would thus be over the Tee beams, while it is at the centre if the ends are free.

The amount of fixture being rather uncertain, some designers calculate the floor slab for a bending moment $= \frac{Wl}{10}$, the constant $\frac{1}{10}$ being intermediate between the value $\frac{1}{8}$ when there is no end fixture, and $\frac{1}{12}$ when there is thorough fixture. This is, however, very conservative practice. The standard specifications of the American Society of Civil Engineers allow the moment to be figured as $\frac{Wl}{12}$ for first class work. It will be seen from Fig. 6 that the end moment would have to be reduced to $\frac{Wl}{24}$ before the centre moment becomes $\frac{Wl}{12}$, and that there would be an end moment of only $Wl(\frac{1}{8} - \frac{1}{10})$, i.e., $\frac{Wl}{40}$ if the centre moment were $\frac{Wl}{10}$. Slabs figured for $\frac{Wl}{12}$ at the centre might, therefore, be considered as amply safe if the work is carried out in a thorough manner. If it is liable to be done roughly, then $\frac{Wl}{10}$ should be used. Fig. 6 shows that over length CC the lower face is in tension, while over PC and QC the upper side is in tension. It is good practice to figure the reinforcement at the centre of the slab to resist $\frac{Wl}{12}$ or $\frac{Wl}{10}$, to run this reinforcement right through the Tee beams, and to place an additional layer of rods on the upper side for the cantilever action. These rods may be placed while the floor is being poured, being laid before the necessary thickness is fully reached.

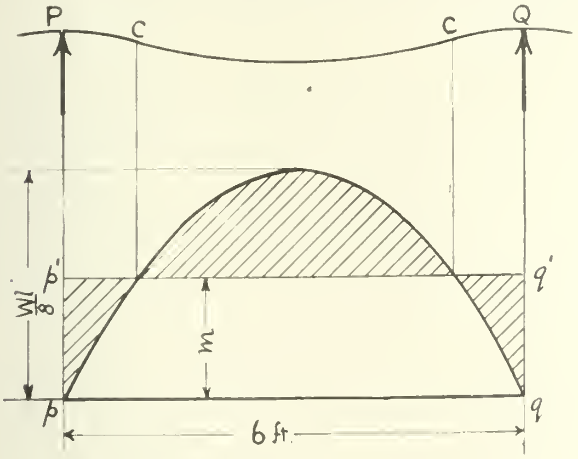


Fig. 6—Bending Moment in Floor Slab

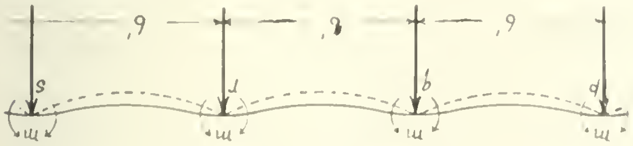


Fig. 7—Action in Floor Slab

Design of Slab

Let the allowable stress in concrete be 600 lb sq. in., in steel 16000 lb sq. in., and let the modulus ratio be 15. Then for the slab considered, taking $M = \frac{Wl}{12}$, we get,

$$\text{Moment to be resisted by one foot width of slab} = \frac{1800 \times 6 \times 12}{12} = 10{,}800 \text{ inch lb}$$

$$\text{From Fig. 4} \quad \frac{f_c}{f_s} = \frac{600}{16000} = \frac{xd}{(1-x)d} \cdot \frac{E_c}{E_s}$$

$$\frac{600}{16000} = \frac{x}{15(1-x)}$$

giving x = 0.36 (locating neutral line).

Thus for 1 ft. width of slab,—

the area in compression

= (12x0.36d) sq. in.

= 4.32d where d = slab thickness to steel c.l.

Total force in compression

$= \frac{600}{2} \times 4.32d$ lb.

= total tension force in steel.

Distance from steel to centre of compression

$= d(1 - \frac{x}{3})$

= 0.88d inches.

$\therefore$ Moment of force in steel $= \frac{600}{2} \times 4.32d \times 0.88d = 10800$

giving d = 3.08 inches

If $\frac{3}{4}''$ be added below the centre of the reinforcing bars, the total thickness becomes 3.83″, say 4″ slab. The original estimate of weight of slab is, therefore, sufficiently close.

The sectional area of steel (A) required in 12″ width of slab is then given by

16000A = total tension = total compression

$= \frac{600}{2} \times 4.32 \times 3.08$ (from above)

$\therefore$ A = 0.25 sq. in.

Using 3/8″ dia. bars (section = 0.11 sq. in.), $\frac{0.25}{0.11} = 2.27$ bars are required.

$\therefore$ Spacing $= \frac{12}{2.27} = 5.25''$.

Hence 3/8″ round bars placed $5\frac{1}{4}''$ c. to c., or any other form of reinforcement giving 0.25 sq. in. section of steel per foot width of slab would be satisfactory.

In order to protect iron objects from rust it is customary to coat them with zinc either electrolytically or by plunging them in a bath of melted zinc after careful cleansing. The disadvantage of these methods is that a real fusion of the two metals is not obtained. As a result the zinc coating is likely to be attacked by the atmosphere. This may be avoided, says the Chemical Trades Journal, by a recently patented process which consists in so preparing the iron that the zinc gets into its pores. After steeping in sulphuric acid the iron is placed in a solution of mercury chloride and heated, this resulting in decomposition of the mercury chloride and precipitation of metallic mercury, which forms an amalgam with the iron on the surface. The iron is then plunged into a zinc bath heated to 500 deg., where it remains three minutes. Iron galvanized by this process shows unusually strong adhesion of coating to metal. Microscopic investigation shows that the zinc penetrates into the pores of the iron, and in case a portion of the coating is worn or broken off the iron does not rust, owing to the presence of sufficient zinc in the pores.

Civilization advances by eliminating physical human effort.

New C. P. R. bridge, near Calgary

THE Canadian Pacific Railway are replacing two twin bridges at miles 7.7 and 7.8, west of Calgary, with other heavier trusses, and the new bridges form an interesting contrast to the old trusses. The first trusses were of the double-intersection Warren type, pin-connected through spans of 213 ft. 9 in. They were twin bridges about 500 feet apart on the main line of the Alberta division of the C. P. R., at a point where the single track crosses the Bow River. The western span, already erected, has an approach span from the east of a through plate girder 74 ft. 10 in. long over all. Pile bents were driven beneath the bridge, upon which the floor system was supported when the trusses were dismantled. The floor system of the old bridge was then removed panel by panel and the corresponding panel of the new floor system was substituted. The new trusses were thereupon erected. There is considerable traffic in both directions at this time of the year, and the necessity of keeping the track open constantly delayed the work, so that it took almost three months for the erection of the first span, which is now completed. The second span is now in the course of being dismantled, and a crew of about twenty men are on the job. For the actual erection a ten-ton erecting car has been used.

C P. R. bridge over Bow River, near Calgary

The new bridges are through trusses of the rivetted Pratt type, having counters in the three center panels, there being nine panels 23 ft. 9 in. long in the clear span of 2,138 ft. 9 in. The trusses are 19 ft. on center lines, and are 31 ft. deep between the centers of gravity of top and bottom chords, being cambered 2½ inches at the centre. The new bridges were designed according to the C. P. R. 1908 Standard Specification for Steel Bridges, which is essentially Cooper's E50 loading. The end posts are built up of 4 ft. 8 in. by 6 in. angles, with two 28 in. web plates and a 28 in. cover plate. The verticals and diagonals have an H-section, being built up of four angles with 13 in. web plates. The top chords consist of two 8 in. x 6 in. angles on top with 28 in. cover plates, two 28 in. web plates and two 6 in. x 6 in. angles at the bottom, with latticing on the bottom of the member. The bottom chords are built up of four 6 in. x 6 in. angles with two 30 in. web plates, latticed top and bottom. The top and bottom laterals are angles. The floor beams are built up girders, with four I-beam stringers between. At one end there is an expansion bearing with seven cold rolled steel rollers bearing on sheet lead in a cast steel roller nest, the other end having a fixed cast iron bearing plate. There is a total of 405 tons of steel in each span.

These bridges were designed in the bridge department of the C. P. R. in Montreal, Mr. Motley being the Bridge Engineer. They were fabricated by the Hamilton Bridge Works, of Hamilton, Ont., who are also doing the erecting. Mr. A. Silverthorn is the local superintendent for the bridge company.

Dismantling old bridge over Bow River

Toronto's Comprehensive Harbor Scheme

Details of Great Plan which looks to the Transformation of the Whole Waterfront at a Cost of Nearly Twenty Million Dollars

THE Toronto Harbor Commissioners, after eight months' study and painstaking work on the part of the engineering staff, have submitted to the city for its approval a comprehensive plan of development which involves a total expenditure of $19,142,088. The total amount which the city is asked to dispense is $1,802,883; the Dominion Government is asked to spend $6,123,284, while the balance of the projected work will be undertaken by the Commissioners at an estimated cost of $11,215,920. Details concerning the plans, which were prepared by Mr. E. L. Cousins, Engineer to the Board, are given herewith, the extract being from the Commissioners' report. Supplementary technical details will be published in the next issue of this journal.

Eastern Section

In the Eastern Section the development planned covers three phases, commercial and dock development, industrial development and park treatment on the lakefront. A breakwater will be constructed an average distance of seven hundred feet out in the lake from the present shore and reaching from the Eastern Harbor Entrance to the east city limits at Victoria Park. To fill the space behind this wall up to eight feet above mean water level, including the 1,000 acres in the industrial district will require twenty-five million cubic yards of material. This material can all be secured from the bay and the bed of the lake outside the breakwater and two large hydraulic dredges will be employed on this work.

The dredging operations will be on a larger scale than ever before attempted in Canada. Each dredge will be capable of dredging either sand or clay from a depth of 50 feet and pumping it for a distance of 4,000 feet through long lines of pipe from which it will be distributed to the area to be filled. The dredge will be built of steel, like an ocean steamship, and will be propelled by twin screws, and controlled by steam steering gear. In this way it can not only go from place to place without the aid of a tug, but can work out in the open lake, and, when a storm comes up, it can disconnect the pipe line and steam into the bay without delay, and, if necessary, take the pipe-line with it.

The machinery will be of 2,000 horse power of the latest improved type and complete electric light and search-lights will be fitted so that work can be carried on at night as well as day. 25,000 tons of sand and clay per day can be dredged and delivered a mile distant by this great dredge. Some idea of what this quantity means may be gathered from the fact that it is sufficient to fill the surface of Yonge street from King to Bloor to a depth of about 2 feet. This will be the most powerful dredge in America. There is nothing equal to it in the United States, although somewhat larger dredges are in use in Britain and in India. Up to the present the largest Canadian hydraulic dredge is the "Tarte" built in Toronto in 1901 and working on the St. Lawrence ship canal below Montreal, but the new dredge to be built will be double the power of the "Tarte."

Notwithstanding its great size and power, the dredge with all its machinery will be handled with ease and under the control of one man on the bridge deck. Here will be located not only complete apparatus for navigating the ship, such as steering wheel, binnacle, engine room telegraphs, &c., but also a battery of levers controlling all the movements of the dredging apparatus, with gauges indicating the depth of working and the amount of sand which is being picked up.

The crew will be cared for in commodious quarters and nothing will be omitted that will contribute to completeness and efficiency.

The dredge will be built from the designs and under the supervision of A. W. Robinson, M. Can. Soc. C.E., the well known dredge-expert of Montreal, consultant on dredging to the British admiralty.

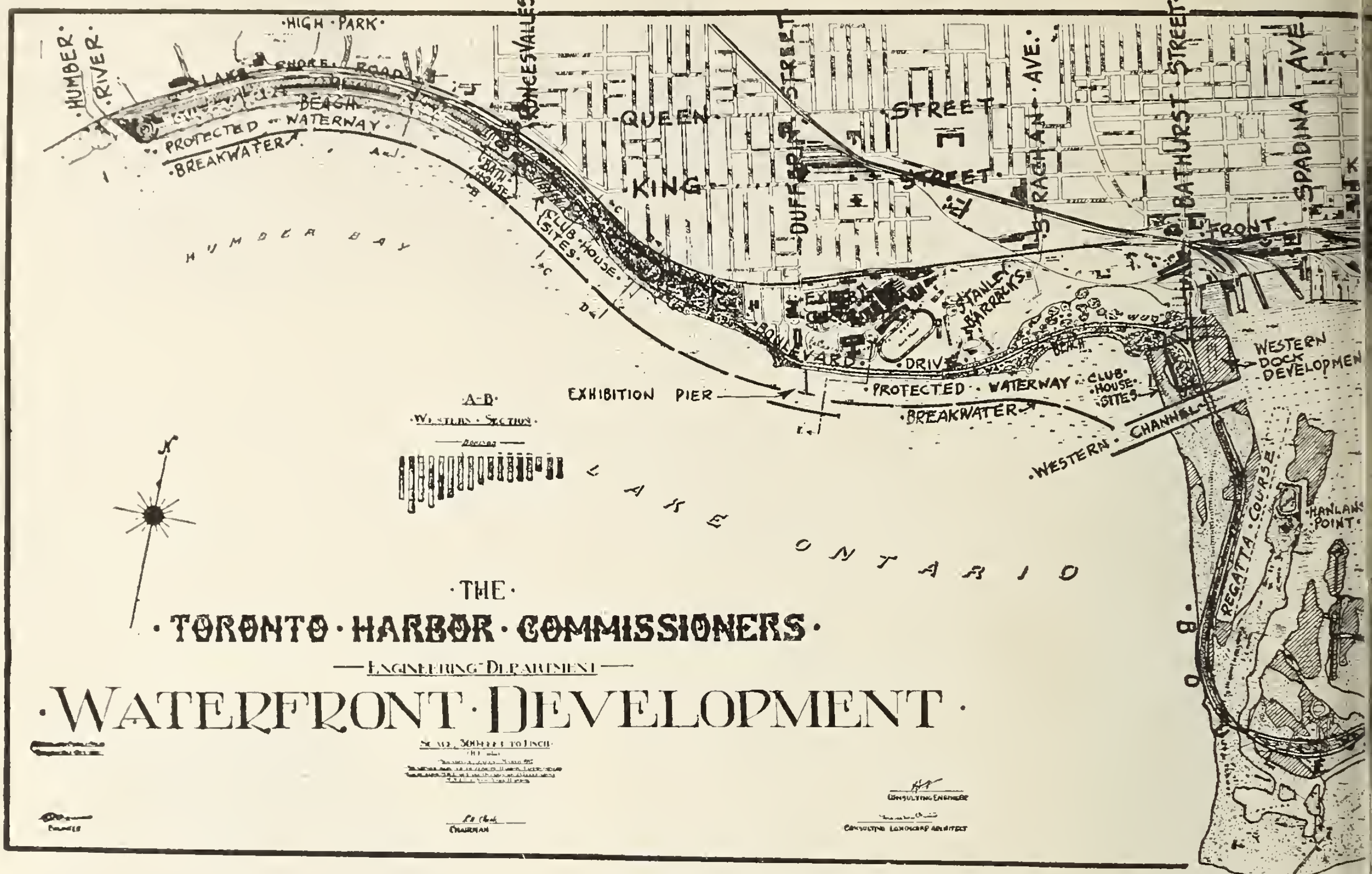
A ship-canal will be constructed for the purpose of extending the inner harbor into the new industrial district. This channel will be 6,800 feet long, 400 feet wide and 24 feet deep and will terminate in a turning basin 1000 feet square and the sides of both the channel and turning basin will be so constructed as to form three miles of dockage accommodation. The industrial area when completed will contain 611 acres of land for factory sites, 235 acres of streets and railroad reservations and 130 acres of waterways.

Mr. E. L. Cousins, Engineer to the Toronto Harbor Commissioners

The roadways will have a minimum width of 75 feet and a maximum width of 175 feet. The district will be served by railway tracks connecting with all the railways and the railway layout has been so arranged that every alternate street will be free from tracks.

The western or bay face of the district will be developed for dock purposes as the district grows and will ultimately add 2½ more miles to the dock frontage of the area, as shown on the plan. One large dock is now being constructed and will be equipped with modern freight sheds and one storage warehouse and the beginning of a series of factory buildings will be erected back of the dock.

The mouth of the Don will be diverted from its present outlet to a new outlet into a slip at the foot of Cherry street and the original Don channel now filled up will be utilized as the location for a highway entrance to the industrial area. This new roadway will run east and west



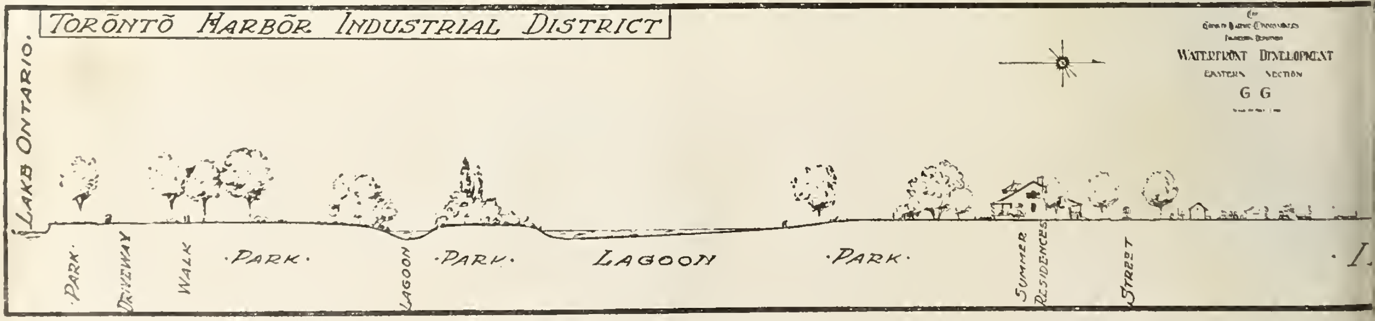
General plan showing the various phases of the extensive developme

and will be connected with Parliament street, Trinity street, Cherry street and the west Don Esplanade and with a connection with Lake street at Parliament street if the former street is ever carried through. The new road will be carried across the diverted Don by means of a bridge a short distance to the east of Cherry street. As Keatings Cut will be closed there will also be entrance to the district via Booth avenue, Logan avenue, Morse street, Carlaw avenue, and Leslie street.

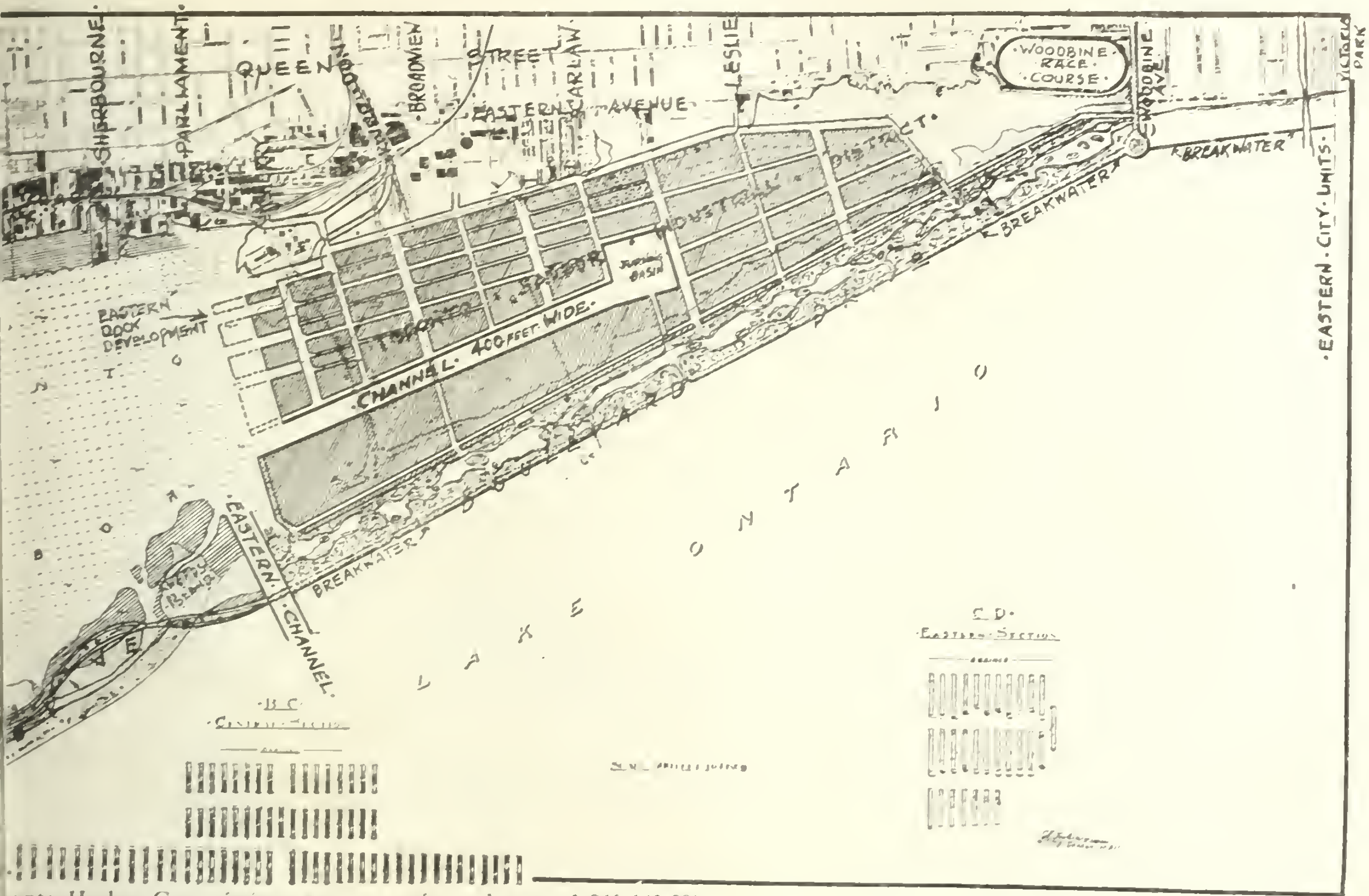
The area north of the ship-channel will be reserved for light manufacturing plants, the area to the east will be the home of heavier plants which do not require direct water service and the area south of the channel will be utilized for the heaviest class of manufacture requiring a frontage direct on navigable water. The width of the channel, 400 feet, will allow a vessel of the largest type to safely pass through it between two vessels of equal size tied up at each side.

Along the beach portion of the reclaimed land a park area 1000 feet wide will be reserved fronting directly on the breakwater. Immediately to the north of the breakwater will be the lakefront boulevard drives and walks with a park and lagoon treatment north of the boulevard and a fine beach to the north of the lagoon. Bridges at reasonable intervals will carry traffic across the lagoon to the lakefront and forty ft. openings in the breakwater at intervals of 2,000 feet will allow seawall craft to pass through from or to the lake. Inside the breakwater fronting on the lagoon will be ample sites for aquatic clubs and a strip of land will also be laid out, north of the park area, as a location for summer homes. There will be an entrance to the lagoon at Woodbine avenue and another from the bay east of the eastern channel and the west face of the area reserved for large industries will be treated in boulevard style so as to make a pleasant approach.

East of Woodbine avenue there will be no park treat-



Cross-section showing treat



onto Harbor Commissioners at an estimated cost of $19,142,088

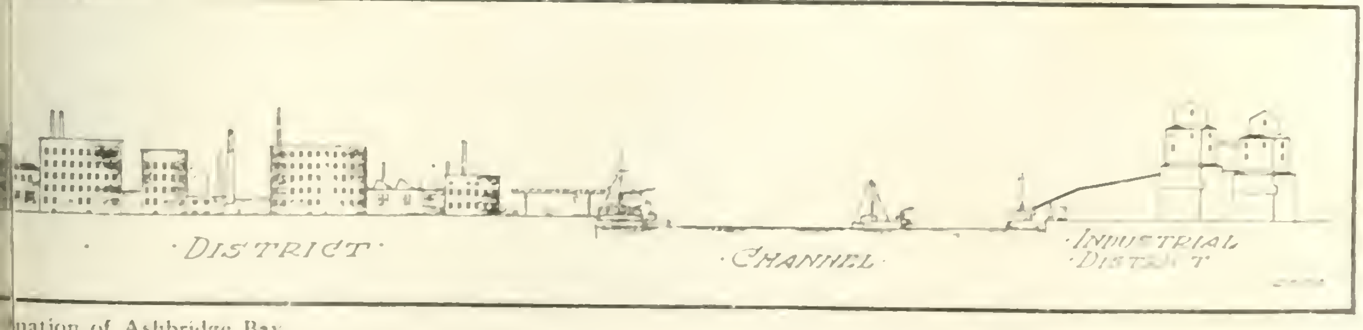
ment but the seawall will be carried to the east city limit leaving a protected waterway for the use of the residents of this district and the public generally.

Central Section

In the Central Section the work planned consists almost entirely of commercial and park development with some industrial land provided at the foot of Bathurst street. The commissioners plan to spend the sum of $2,194,000 in the construction and equipment of proper docks in the area from Bay street to York street and at the foot of Bathurst street but the details of construction for the central development cannot be worked out until the question of the separation of railway and highway grades has been definitely settled.

At the foot of Bathurst street a dock and industrial area of 17 acres will be provided north of the new Western Channel and east of the boulevard drive. This area will be served by 200 feet of dock with 20 feet of water and will be accessible to all railway lines.

The commissioners propose to construct at this point modern freight sheds and storage warehouses and a factory building similar to the one planned for the Eastern Section. The balance of the work in the Central Section consists of the reclamation of 152 acres of additional park land on the Island, a portion of which will serve as a location for the boulevard drive and the balance will improve the present unsightly portion of the Island. The boulevard drive will be carried from the east across the Eastern Channel by means of a roller lift bridge giving a clear entrance for boats of 200 ft. The drive across the Island will follow a winding course close to the bay shore, thus preserving the beaches to the public, and will cross the Western Channel on another lift bridge. On the Island south of the Western Channel, a large area for a new park will be provided and to the north of the channel on the east



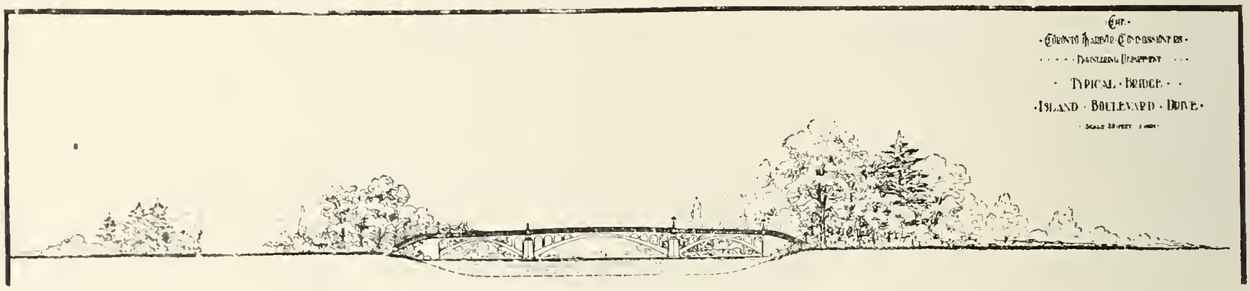
nation of Ashbridge Bay

side of the boulevard drive will be the industrial and dock area referred to.

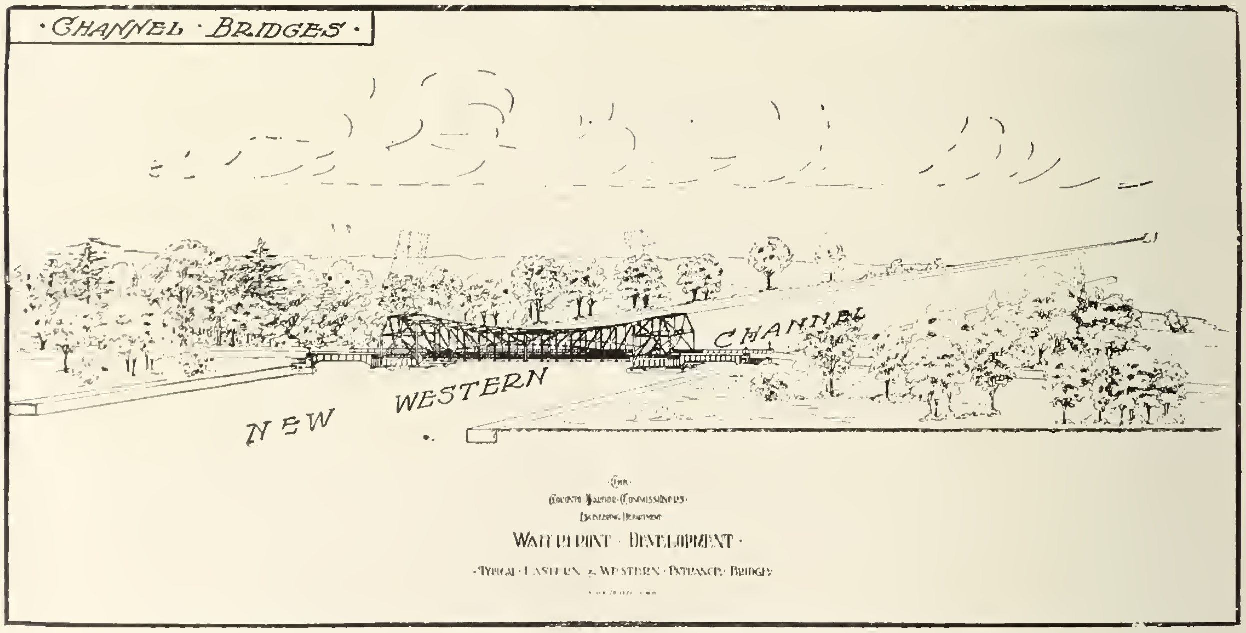
Western Section

From Bathurst street to the Humber River the treatment is entirely along park lines, there being no provision for commercial development. A breakwater will be constructed from a point of 200 feet west of the new channel to a point at the mouth of the Humber River and distant an average of 900 feet from the existing shore line. Inside this breakwater will be a protected waterway with an average width of 500 feet reaching from the Humber to Bathurst street and linking up with the Island lagoon system and the new lagoon system planned for the Eastern Section to form a complete protected waterway across the entire city front.

Inside this waterway boats will be in perfect safety no matter what the weather is on the lake and the section west of Bathurst street will be available for a ferry service to the Exhibition Grounds and the Humber.



Typical bridge on the Island boulevard drive



Plan showing the roller lift bridge on which the boulevard driveway will be carried across the harbor entrance

The Western breakwater will be broken every 2,000 ft. by forty ft. openings to permit of the egress or ingress of sailing or other craft.

The Boulevard Drive will cross the new Western Channel and run north to the present old Western Channel which will be filled up. At this point it will divide into two roads one running north to the foot of Bathurst street, which street it is proposed to extend straight south from Front street with a width of 100 feet and the other branch turning to the west fron the old Western Channel, past the front of the Old Fort and Stanley Barracks to join the present piece of seawall in front of the Exhibition Grounds. The present seawall and boulevard will be incorporated in the drive and west of Dufferin street an ascent will be made to the top of the high bank in order to give the public the benefit of the fine view over the lake. The high ground is followed to the west end of Cliff Road, the drive being close to the edge of the bank, and the drive there descends to the level of eight feet above the lake, following this level.

From Bathurst street to the Exhibition Grounds and from Cliff Road to the Humber the sand pumps will be utilized to reclaim areas of property for park purposes and from Sunnyside to the Humber, over a mile of fine sand bathing beach will be made and a bath-house erected at its east end. In the same district sufficient land will be reclaimed to provide for an 80 ft. reservation for a radial railway entrance to the city along the location of the present Lakeshore Road with a new 66 ft. commercial road to the south of the reservation. This roadway will replace the Lakeshore Road and will serve as the business entrance to a tier of lots reserved for building purposes. In front of this tier of building lots and 3 ft. above the boulevard proper will be a terraced boulevard and walks 55 feet wide faced by a parapet wall and with steps at intervals leading onto the boulevard proper. Outside the boulevard and bridle paths will be the bathing beach and protected waterway with the breakwater as its southern boundary.

Do not miss the special series on Reinforced Concrete Construction, by Professor Brown, of McGill University. The first article is published in this issue.

Winnipeg's Building Total Mounting Up

Western Metropolis has Nearly Reached the Twenty-Million-Dollar Mark with Another Month To Go—Progress Reports

Winnipeg, Nov. 15, 1912.

THE building permits for this city now having passed $19,500,000 for 1912, it is practically certain that the anticipated $20,000,000 mark will be reached before the end of the year. Permits for the past week have averaged $20,000 a day and a similar average would bring the total well above the mark.

The Crescent Creamery Co. have taken out a permit for $200,000, this being a part of their new $350,000 plant, which is to be erected on Burnell street, between Ellice and Livinia The work will be started immediately, on the building for the manufacture of ice cream, and also on the stables. The former will be 80 ft x 80 ft., two storeys and basement, and will have a capacity of 8,000 gallons of ice cream per day. The refrigerating and ice making machinery for the entire plant will be located in this building. All the buildings in the plant will be of reinforced concrete construction, with brick enclosing walls faced with pressed brick.

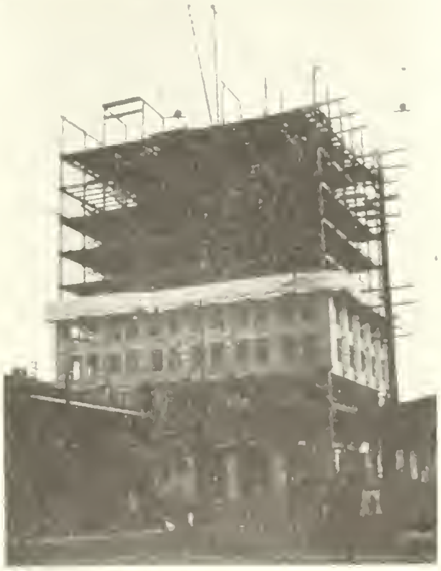
The illustration shows the massive structure of the Bank of Commerce, situated on Main street between Lombard and McDermot, which was formally opened by Sir Edmund Walker on Oct. 26th. The lower part of the new Union Trust Building is seen in the foreground. The bank building presents a fine massive facade with its eight Roman Doric columns extending from the first floor to the cornice. These columns together with the entire front of the building and the cornice are built of Tyndall stone.

The contrast between this style and the terra cotta front of the adjoining Union Trust building is very marked. The building is six storeys high with a basement and sub-basement. The banking chamber is three storeys in height The floor is tiled and the walls, for more than half the height, are lined with marble. Private rooms for the officers of the bank are on the Main street frontage. The interior finish is fully equal to the exterior and undoubtedly the building is one of which the bank may well be proud. The Lyall Mitchell Co. were the general contractors on this work.

Another illustration shows the state of the work on the Winnipeg Electric Railway Company's building on Notre Dame avenue The steel framework is practically completed and work at the walls has been started from the ground and also from the third storey; several storeys are enclosed at the present time It looks as though most of the exterior work would be completed before the extreme cold weather sets in. The rate of progress on this building reflects great credit on the general contractors, Messrs. Carter-Halls & Aldinger.

The new Bank of Commerce Building, Winnipeg

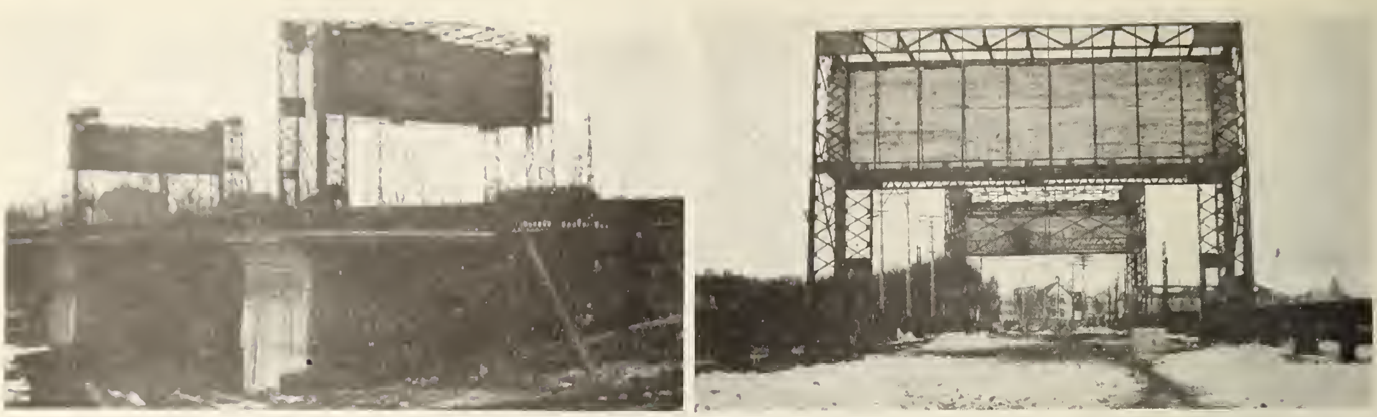
Another illustration shows the steel frame of the new Granite Curling Rink which is being erected on Moyston Place and Colony street south, one block nearer to the Assiniboine River than the Amphitheatre Rink. The building will cost $75,000 and will consist of the rink proper and a handsome club house at the eastern or front end of the building. The building will be 147 ft. wide and 210 ft. long; the ring being 170 ft. in length. The frame, as the illustration shows, is structural steel I-beams and channels. The walls are reinforced concrete with brick pilasters. There are to be 9 sheets of ice and there will be ample space between each sheet to prevent crowding of players Along the sides are long aisles for spectators.



Winnipeg Electric Railway Company's Building under construction

The club house at the front of the building will be up-to-date in every respect and will be furnished with every modern luxury for the convenience of the members This building will consist of three storeys, the second of which will contain a service kitchen, ladies' reception room, and a large club assembly hall. There will be a gallery off the club room, from which members can watch the progress of the various games The third storey will be devoted mainly to billiard rooms The cornice will be sheet metal and the front of the building trimmed with Buff Bedford Indiana stone Thomas Kelly & Sons, of Winnipeg, are the general contractors, the steel work was supplied and erected by the Wisconsin Bridge and Iron Works of North Milwaukee James Chisholm & Son are the architects

The remaining two illustrations show the new Osborne Street bridge over the Assiniboine River This bridge is of the bascule type, the centre section being split in the middle and lifting up from each side The large concrete counter weights at the top of the structure are plainly shown in the illustration The bridge is 115 ft. long and the road space is 42 ft. wide, with 6 ft. on each side for



Constructional views of the new Osborne Street Bridge over the Assiniboine River at Winnipeg

sidewalks. The lifting mechanism is operated by manual labor, the drive being transmitted through a series of spur and bevel gears, located in a compartment under the bridge, access to which is obtained through a manhole to a large gear quadrant which lifts the section.

The bridge is illuminated by tungsten lamps, of 250 watts rating, on ornamental iron standards. There are two lamps per standard except at the junction point where there is a standard on each side of the dividing line with only one lamp arm on each. The messenger cable, which supports the trolley wire, is also carried from the tops of these standards. There will be 9 standards on each side of the bridge making a total of 34 lamps. The bridge is double-tracked for street cars. The road bed is paved with treated wooden blocks laid in tar.

Frankman Bros. are the general contractors. The steel work was supplied by the Manitoba Bridge and Iron Co. The bridge is open for traffic now but the trolley wires have not yet been strung for the street cars. They will likely be running next week. —L.M.

Excellent Record of the Federal Capital

Building Operations Proceeding Apace — Residential Activity the Outstanding Feature of a Busy Season—All Trades Well Employed—Unskilled Labor Scarce

OTTAWA

November 18, 1912

Active building operations still continue at the capital. During the ten months ending Oct. 31 the amount of permits issued at the City Hall aggregated $3,150,875, as against $2,587,900 for the corresponding period of last year.

A feature of the constructional season now closing has been the large number of permits issued for residences costing between $8,000 and $20,000. An idea of the type of residences erected in the Capital is given in the photograph of Mr. Blythe's house on Linden avenue, costing some $12,000. Mr. W. Herbert George is the architect.

Good progress is being made on the new reinforced concrete theatre now being erected on York street for Mr P. Labelle, at a cost of $50,000. The ground floor of this structure will be used for stores. Externally the walls will be faced with stone and brick.

The apartment houses on Charlotte street, being erected by Mr. Coplan (who is doing his own contracting for them) are externally practically completed. They are constructed of pressed brick with stone foundations and the cost is some $40,000. Mr. W. Herbert George is the architect.

All the main reinforced concrete work has been completed on the Masonic Temple, Metcalfe street, and also on Jackson street. Mr. D. Ewart is the architect for both these buildings which in cost aggregate about $200,000. The finishing work will be carried on during the winter month.

The Ottawa Electric Railway have now their rails laid over this work and hope to connect up with Sparks and Rideau streets within a week. Ornamental cast iron columns will be placed in the "devil strip" to carry the overhead trolley wires. The roadway will be paved with wood blocks.

The progress on the above structure during the past few weeks has been remarkable. Practically all the arches are finished now, excepting the one over the canal which will not be commenced until the water is out. The bridge should be finished by the beginning of May next.

There is a possibility that the second link of the St. Lawrence and Ottawa Electric Railway—from Ottawa to Chats Falls—will be surveyed this fall. The surveyors of the road have completed this work as far as Nanotick. It has been stated that construction work will probably be

Blythe residence, Linden Ave., Ottawa
Mr. W. H. George, architect

commenced early next June. In this way it is hoped that the company will be in a position to operate an Ottawa-Chats Falls electric line in the summer of 1914. A meeting of the directors will be called shortly, when Mr. Morden, the chief engineer, will make a report.

The grading of the streets in Ottawa South for the extension of the Ottawa Electric Railway has almost been completed. The existing double track terminates at Wilton Crescent. The existing loop for the turning of the cars commences at Centre street and runs on Monk street and Wilton Crescent into Bank street again. A double track will be carried from Wilton Crescent over the new Bank street high level bridge right to Sunnyside avenue, where the loop commences, and will run along Sunnyside to Seneca, along Seneca to Grove, and along Grove until Bank street is reached again. The exact distance (measured by single track) is 157 miles, and the estimated cost of track, grading, etc., is $26,000. This constitutes one of the three most important extensions of the Ottawa Electric Railway programme for 1913.

Masonic Temple, Metcalfe Street Mr. J. A. Ewart, architect

Large cut in concrete sidewalk construction on Carling Ave.

The City Council considered, at their last meeting, the recommendation of the Board of Health to establish a civic abattoir, and placed the whole matter in the hands of the Board of Control. It is probable that this building will be proceeded with.

This new pavement, only completed about six weeks ago, has already been cut up by the Ottawa Gas Company. The cut was made in order to carry out some repairs to their main which was leaking badly. The city can do nothing in such cases, as under the company's charter they may tear up the whole street to lay a pipe or make repairs, so long as the city is notified and they pay the cost of the repairs to the pavement. Sparks street pavement is the best piece of asphalt work in the city, but its chance has been spoiled, as the cutting of the asphalt is really the 'beginning of the end' of a pavement's life.

Messrs. Laurin & Leitch, of Montreal, are making excellent progress with the construction of the new intake pipe for the city. About 1,300 feet out of 2,400 feet has been laid to date and 800 feet has been rivetted. The contract calls for the pipe in the aqueduct to be finished by December 1st. A bonus of $200 will be given for every day that the pipe is completed before that date.

Commencement of pipe line in aqueduct

In connection with the new intake pipe, three electrically driven Rees Roturbo pumps, having a capacity of 12,000,000 gallons a day, will be placed at its head on Lemieux Island and will have a lift of twelve feet. This will throw the whole line of the 42-inch pipe supporting the city under a head of water sufficient to insure the pressure being outwards all along the pipe line, this doing away with the possible entrance of contaminated water. Mr. William Storrie is engineer in charge for the city.

The preliminary plans are almost ready to be placed before the City Council for their approval. Mr. Fuller of Messrs. Hazen & Whipple, anticipates that these plans will be completed next week. The City Council, immediately they approve of the plans, will place them before the

Provincial Health authorities to sanction the construction of the filtration plant

The finishing of the asphalt pavements under contract for the city has been somewhat retarded by the inclement weather and the City Engineer has not, as yet, notified the contractors to close down work for the season. The Gladstone avenue pavement has just been completed. Wellington street and Spadina avenue were completed last week. Mosgrove street pavement is still under construction and the work is being pushed with all possible speed so as to ensure its completion before the frost sets in. The work is being done by day labor.

Sidewalk construction has also been retarded by the weather, and also by large stone fills and cuts. It is anticipated, however, that the mileage will only fall short of last year's totals by two miles. A photo reproduced herewith shows the extent of a cut on Casting avenue, where six feet, for about 700 feet, had to be excavated before grade was reached. One gang (day labor) of a hundred men has been kept steadily employed during the season on concrete walks. The work is expected to close this week.

Labor

Men of the "unskilled labor" class (especially foreigners) are difficult to secure as many are making for the bush to spend the winter in the lumber camps.

All the men in the building trades are busily engaged in construction work. —L.H.

Montreal Draft Building Code Completed

After many months of work, Messrs. Walter Frances and Joseph Venne have completed their draft of a building code for Montreal. These gentlemen were a sub-committee of a larger body appointed to consider the subject, and on more than one occasion have complained of the want of co-operation on the part of the civic authorities. The draft covers 213 type-written pages and contains 1000 clauses. The most radical recommendations relate to the prevention of fires, in factories, and the introduction of smoke-proof towers in factories and schools, as well as the installation of some efficient fire escapes. "This," says the report, "is to replace the practically useless and generally dangerous type of outside grate bar fire escapes." The safeguards against explosion by the improper use of naptha, and the rigid requirements respecting fireproofness in theatres are given special attention.

In speaking of the present city regulations the report says that they place on the building department duties which should be assigned either to the police or the fire department. Thus all matters relating to fires in buildings should come entirely within the province of the fire department.

A careful study was made by European and American regulations. The European methods proved of little use, owing to the different methods of construction. The American by-laws, more particularly studied were those of Toronto, Ottawa, Westmount, Columbia, Cleveland, Chicago, Cincinnati, Indianapolis, New York, Jersey City, Pittsburgh, Philadelphia, St. Paul, Richmond, Minneapolis, Milwaukee, St. Louis, Providence, Buffalo, and Boston.

The building department is overloaded with work, and part of this should be transferred to other departments. "Our idea of a building department," say the experts, "is an organization having entire charge as regards construction of buildings and their equipment during erection, alteration, and repairs. We believe that the department should be in a position so to pass upon plans submitted with the applications that the owner may have double assurance that his construction will be what it ought to be. The present organization of the building department is too small to perform its duties. The part of the by-law referring to public buildings says that their stairways shall be not less than one-fortieth of the number of persons accommodated or present at any one time above such stairways."

Every scheme for the accommodation of 600 and more pupils shall be provided with a smoke proof tower, or towers, and with other devices of sufficient capacity to permit all the occupants of the building safely to reach the ground within a space of three minutes, says another section. All exterior doors of public schools must be capable of being opened from the inside, without special knowledge or effort. The moving picture show regulations are also very strict.

In referring to dwellings, the by-law says that every sleeping room shall be provided with a window opening directly on a street, yard or court except when the room is lighted or ventilated by sky lights. The total net window area of a sleeping room must not be less than twelve feet. No sleeping room is to have a ceiling less than four and a half feet from the curb or ground level.

Respecting elevated tanks, the measure says, that it is forbidden to have one on any building except when special provision has been made for it from the foundations up.

The progress made in the construction of the Superior Brick Company's plant at Fort William was the subject of a paragraph on page 65 of the Contract Record for November 13. Supplementary information concerning this company has since been received from Mr. Kenneth R. Ayer, the manager. The company has been incorporated with a capital of $500,000, with a view to catering for at least a portion of the western Canada demand for brick and other clay products. The company has secured an excellent property of some 70 acres about sixteen miles out of Fort William on the line of the Canadian Northern Railroad. The clay mined is said to be equal to the Laprairie shale and is easier to work. The company expects to be able to reduce the Winnipeg price to $20 to $26 a thousand, while there will be a considerable market at Fort William and Port Arthur. The manager of the plant, Mr. K. R. Ayer, has had an extended practical experience in the clay industry, not a little of which he acquired at Laprairie. He is a graduate of the McGill and Ohio State Universities. The complete directorate of the Superior Brick Company, Limited, is as follows: president, Mr. A. A. Ayer, Montreal; vice-president, Mr. G. F. Stephens, Winnipeg; secretary-treasurer, Mr. G. H. Duncan; provisional directors: Mr. T. B. Brown, Port Arthur; Mr. R. D. Sutherland, Fort William; Mr. Kenneth R. Ayer, Fort William; Mr. J. B. Hutchison, Fort William.

The Canadian Supply Company, 220 King Street West, Toronto, waterproofing engineers and contractors, have recently been awarded a number of large contracts, which include the waterproofing of the new Toronto warehouse of the Lake of the Woods Milling Company; the roofing and metal work of the Swift Canadian Fertilizer plant at West Toronto; the roofing and metal work of the Brown copper and brass mills, New Toronto; the roofing of the St. Lawrence Starch Company's plant at Port Credit; the roofing of the Dominion Bridge Company's plant at West Toronto, and the roofing of the new addition to the Canadian General Electric Company's plant at Peterborough, Ont. Another contract they have just received is for the roofing of the Westminster Apartments, Toronto.

Mr. F. A. Robertson ('08 Science), who has been in charge at the Toronto office of the cement and reinforced concrete departments of the Canadian Inspection and Testing Laboratories Company, Limited, has severed his connection with the above concern to join the selling forces of the Canada Cement Company, Limited.

Canadian Railroad Development

The Canadian Pacific Railway will double track a line eight miles long from Saskatoon, Sask., to Sutherland.

The Canadian Northern Railway expect to complete before the end of December, 62 miles of their main line from the Pembina River to the McLeod River.

Mr. J. G. Sullivan, chief engineer, Canadian Pacific Railway, Winnipeg, Man., is reported to have asked for bids on the construction of an eight-mile tunnel through the Selkirk Mountains in the vicinity of Illicillewaet, B.C.

Owing to the rapid growth of business in the city of Edmonton the freight offices of the Grand Trunk Pacific there have become inadequate, necessitating the removal which has just taken place to larger and more suitable quarters.

Chief Engineer Sullivan, of the Canadian Pacific Railway, recently stated that owing to the growth of western business his company would shortly start work on a four-track system between Brandon and Ft. William.

The Wetaskiwin, Yellow Head and Revelstoke Railway Company will at an early date apply to parliament for incorporation for the purpose of constructing a railway line from Wetaskiwin, Sask., through the Yellow Head Pass to Revelstoke, B.C.

The Alberta Peace River and Eastern Railway, a company backed by English capitalists and continental bankers, have obtained the approval of the Canadian Minister of Railways for the construction of the first section, about four hundred miles, of their line to extend from the Pacific Ocean to Hudson Bay, a total distance of about 1,600 miles.

It is announced that a proposition is now under way for the erection of a $2,000,000 station at the corner of James and Murray streets, Hamilton, to be built jointly by the G. T. R. and C. N. R. Engineers have been at work on the matter and it is expected that work will be started next spring.

After two months' steady work on the Nechaco River in British Columbia, Messrs. Foley, Welch & Stewart, who are building the Grand Trunk Pacific main line, have made the river absolutely clear and safe for navigation from its mouth where it empties into the Fraser to Fraser Lake, a distance of more than one hundred miles.

It is understood that the Canadian Northern Railway will seek legislation at this session of the Dominion Government, providing for its maritime outlet for through traffic from the west. The company has two outlets in view, one by utilizing the Intercolonial from Montreal or Quebec to St. John and Halifax, and the other by using the Boston and Maine line to Boston

Sir Wm. Mackenzie, president of the Canadian Northern Railway, recently gave out the statement that work on the C. N. R. Toronto to Hamilton line, would be started as soon as possible in the spring. He further said that a right-of-way between Hamilton and Niagara Falls was being secured and that work would probably start in the spring on this line

Notice was recently given of application to Parliament for legislation incorporating the All Red Line Railway Company, with power to construct a railway from the easterly boundary of Quebec Province to Winnipeg "by the most feasible route." Authority is also sought to construct branch lines north to the main line from Quebec, Montreal, Ottawa and Fort William or Port Arthur

Mr. Andrew Laidlaw, of Victoria, president of the Jasper Park Collieries, Ltd., situated on the line of the Grand Trunk Pacific and Canadian Northern railways, has entered into a contract, on behalf of his company, with the Grand Trunk Pacific to supply the railway with 800,000 tons of coal during the next two years.

The Board of Railway Commissioners have granted the application of the Grand Trunk Pacific Railway for approval of the construction of its Calgary boundary branch across highways from mile 81.41 to mile 90.43 South Alberta. The roadbed of the Grand Trunk Pacific has now been completed right into Calgary and is in readiness for the rails.

The Pacific Great Eastern Development Company, Limited, a subsidiary company of the Pacific Great Eastern Railway, has just been incorporated by letters patent issued by the Provincial Government of British Columbia, with powers to operate hotels, electric railway lines, develop water powers and to conduct a general land and real estate business. The announced capital is $250,000, and the incorporators are Messrs. Timothy Foley, P. Welch, J. W. Stewart and D'Arcy Tate.

Mr. Morley Donaldson, vice-president and general manager of the Grand Trunk Pacific Railway, recently gave out an interesting statement regarding the progress of that road. He states that six thousand men will be employed by the Grand Trunk Pacific during the winter, five thousand of this number being at work on the western end alone. Although every effort is being made to expedite construction, Mr. Donaldson states that no exact forecast can be made as to the possibility of the line being completed to the Pacific coast in 1913, and until June next year it would be impossible to say what the propspects of completing the line would be. The Grand Trunk Pacific have handled a large proportion of the grain in the west this fall, which has served very considerably to alleviate the usual congestion.

Lecturers in Highway Engineering at Columbia University

The following Non-Resident Lecturers in Highway Engineering have been appointed for the 1912-1913 session at Columbia University: John A. Bensel, New York State Engineer; William H. Connell, Chief, Bureau of Highways and Street Cleaning, Philadelphia; Morris L. Cooke, Director, Department of Public Works, Philadelphia; C. A. Crane, Secretary, The General Contractors Association; W. W. Crosby, Chief Engineer to the Maryland Geological Survey and Consulting Engineer, Baltimore; Charles Henry Davis, President, National Highways Association; A. W. Dow, Chemical and Consulting Paving Engineer, New York City; Walter H. Fulweiler, Engineer, Research Department, United Gas Improvement Company; John M. Goodell, Editor-in-Chief, Engineering Record; D. L. Hough, President, The United Engineering and Contracting Company; Arthur N. Johnson, State Highway Engineer of Illinois; Nelson P. Lewis, Chief Engineer, Board of Estimate and Apportionment, New York City; J. C. Nagle, Professor of Civil Engineering and Dean of the School of Engineering, Agricultural and Mechanical College of Texas; Harold Parker, First Vice President, Hassam Paving Company; H. B. Pullar, Assistant Manager and Chief Chemist, American Asphaltum & Rubber Company; J. M. F. de Pulligny, Ingenieur en Chef des Ponts et Chaussees, et Directeur, Mission Francaise d'Ingenieurs aux Etats Unis; John R. Rablin, Chief Engineer, Massachusetts Metropolitan Park Commission, Clifford Richardson, Consulting Engineer, New York City, Philip P. Sharples Chief Chemist, Barrett Manufacturing Company; Francis P. Smith, Chemical and Consulting Paving Engineer, New York City; Albert Sommer, Consulting Chemist, Philadelphia, George W. Tillson, Consulting Engineer to the President of the Borough of Brooklyn

Mainly Constructional

The News in Brief—From the Atlantic to the Pacific.

The Columbia Theatre, Vancouver's new and up-to-date playhouse, which cost approximately $90,000, has been completed and will be opened in the course of a couple of weeks.

Commissioner Harrison, of Edmonton, estimates that $12,000,000 will be needed for municipal development in that city next year

If the suggestion of City Engineer Latornel is carried out, Edmonton will shortly have, in addition to its other publicly owned utilities, a municipal paving plant.

Plans are now being examined for the Provincial University building at Victoria, B.C. The award to the successful architect will be made in a few weeks.

Works Commissioner Harris has recommended the installation of a sewerage system in West Toronto, to cost approximately $385,000.

As a result of proposals by Mr. W. H. Breithaupt, C.E., the city council of Berlin, Ont., will undertake a general system of city planning. The council propose to engage an expert in city planning before taking any further steps.

It is believed that the Dominion Government will re-introduce early in the coming session the Canada Highways Improvement Act, one of the important measures defeated during the last session.

The sand stone brick factory, capable of turning out from three to four thousand bricks a day, which is being erected at Prince Albert at an outlay of about $55,000, will be completed and in working order in the course of a few weeks.

The town of Outremont, P.Q., having refused to sanction the building of a convent, valued at $1,000,000, the Sisters of Jesus and Mary are promoting a bill in the Quebec Legislature to over-rule the by-law prohibiting the building of such structures on a particular street.

Within a few days a new tunnel fifty yards in length will be completed under the Thames River at London, Eng., which, by the way, is the fourth to be constructed under this river by the London County Council. The cost of this last one will be in the neighborhood of $435,000.

The Smart Turner Machine Co., Limited, Hamilton, Ont are supplying the Standard Steel Construction Co., Ltd., Welland, Ont., with a duplex double acting power pump. They are also furnishing the National Sand and Material Co., Ltd., Welland, Ont., with one of their standard duplex pumps.

The Humber Cement Brick Company, Limited, has been incorporated with a capital of $40,000 to manufacture and deal in bricks, cement bricks and builders' supplies, with head office at Toronto. The provisional directors are Messrs. J. A McAndrew, G. H. Kilmer and W. H. Irving, all of Toronto.

The City Commissioners of Edmonton, Alta., have instructed City Engineer Latornel to obtain prices and information with regard to the establishing of a paving plant of a capacity not less than 100,000 square yards. The approximate cost of this plant will be $50,000.

Judge Lafontaine, at Montreal, recently ruled in the case between the Montreal Street Railway and its men, that the Lemieux Act, providing for the nomination of a Board of Conciliation to enquire into disputes between employer and employee, is constitutional and hence the board named to look into certain differences between the Montreal Street Railway and its employees, was regularly and legally appointed.

Since Mr. Norman McLeod took over the contract for constructing the Montreal civic filration plant very great progress has been made, and, in fact, the time previously lost has been more than made up. Messrs. Hering and Fuller, the New York experts, who designed the plant, have just made an inspection of the work.

The Government of New South Wales has concluded a fifty years' agreement with the Broken Hill Proprietary Company with regard to the establishment of a $15,000,000 iron and steel works at Newcastle, the second largest city in New South Wales, situated on the coast about one hundred miles north of Sydney.

Mr. Justice Demers has given judgment in a test case against the city of Montreal for payment of a small portion of a frontage taken for sidewalk purposes. The city neglected to expropriate the land, but took it over without paying for it. The judge held that the city was liable, and gave judgment for the full amount claimed.

According to the report of engineers who have been employed for the last year by the St. John River Commission, it is suggested that about $1,000,000 be expended for the improvement of the St. John River channel and the building of new dams. The Commission will meet soon to consider this report.

A committee of the Montreal Builders' Exchange have been appointed to meet delegates from the Plasterers' Union relative to a demand for an increase of wages from 45 cents to 55 cents per hour, dating from January 1st next. Many employers have made big contracts, based on the present rate, and an advance will mean a considerable difference. It is probable that a compromise will be agreed on, on the basis of 47½ cents per hour from January to the end of June, and 50 cents per hour from July 1st. An agreement for three years is also likely.

By a majority of two, the Montreal Council have shelved the question of constructing a boulevard 14 miles long along the banks of the aqueduct during the operations of enlarging it. Much of the required land has been offered free to the city, but a majority of the aldermen were opposed to the project on the ground that much of the territory was outside the city limits. The engineer was in favor of this scheme, as it would reduce the price of excavating the aqueduct by $227,880, the earth taken out being utilized for constructing the boulevard.s

The recently organized National Brick Company have secured an excellent property at Cooksville, fourteen miles from Toronto. It is stated that the construction of the plant will be commenced immediately; that the contract has been awarded to the Peter Lyall & Sons Construction Company, Limited, and that the company will be producing 350,000 bricks a day early next May. The Canadian Pacific Railway line runs right across the property. The National Brick Company is capitalized at $2,000,000. The directorate includes Mr. J. M. Greenshields, of Montreal, and Mr. Thos. Long, of Toronto. Mr. L. W. McArthur, general superintendent of the National Brick Company, of Laprairie, who has made an examination of the quality of the shale, makes the statement that the quality of the shale obtained on the property has been found to be superior to that from which the famous Laprairie brick is made.

The Manchester Ship Canal Company, Manchester, England, have placed a contract with Messrs. Henry Simon & Son, Manchester, for the construction of a 1,500,000 bushel reinforced concrete elevator on the American system. The elevator was designed by John S. Metcalf Company, Limited, Montreal and Chicago, who are acting as consulting engineers for the Ship Canal Company on the work. It will be of reinforced concrete throughout, and will have large capacity for receiving grain in bulk, storing, sacking, and for shipping in sacks and in bulk. The approximate total cost is $900,000.

Arising out of a partial breakdown of the Montreal water service, the Canadian Fire Underwriters' Association asked the Controllers to appoint three experts to investigate the management of the waterworks department and severely criticised the conduct of that department. The Controllers stated they saw no necessity for this investigation, but the Council have sent back the Controllers' report, with a recommendation in favor of the appointment of a commission. The aldermen declared that they desired the investigation to reassure the public, and to allow those who had complained to prove their accusation of the bad management attributed to the engineers' department.

When the city of Montreal annexed the municipality of Cote des Neiges two years ago it was agreed that extensive public improvements should be carried out, costing between eight and ten million dollars. The city has failed to fulfill the obligations, and several residents have brought an action in the Supreme Court to enforce the conditions of the annexation Act. Legal liability was admitted, but it was stated that the city was unable to carry out at once the promised works in this and other annexed districts. The judge, after considering the points raised, ordered the issue of a writ of mandamus against the city. Further proceedings are to be taken on the merits of the case.

Sand-Lime Convention for Toronto

The annual convention of the American Association of Manufacturers of Sand-Lime Products will be held in Toronto, December 3-4. An advance programme of the proceedings has been furnished us by Mr. W. E. Plumber, Jr., the secretary of the Association, who is enthusiastic in his predictions of success for the coming meeting. Among the papers to be submitted will be one entitled, "Results of Testing Sand-Lime Brick," by Mr. Warren E. Emly, of the U. S. Bureau of Standards; another is "The Present Condition of the Industry," by Mr. W. H. Crume. The meetings will be held at the King Edward Hotel On the evening of the first day, December 3, an address of welcome will be given by His Worship Mayor Hocken, of Toronto. A banquet will be held on that evening. During their visit the members will be entertained by the Toronto Brick Company and the Harbor Brick Company. Attention is directed to the fact that Toronto to-day is making and selling 150,000 sand lime brick daily, and that consequently the city is an excellent meeting place.

Whitehead Firm Looking to Canadian Business

Mr W. B. Newman, manager for Messrs John Whitehead & Company, Albert Works, Preston Eng., is taking a business tour through Canada in the interests of his firm Interviewed recently, Mr. Newman spoke optimistically of his company's prospects of working up a good business with the Dominion He stated that his firm had successfully competed with German, French and American manufacturers of brick, tile and pipe machinery Continuing, Mr Newman stated that the products of his firm were used extensively in South Africa Australia, India and notably in Turkey, Bulgaria and the other Balkan states.

Over sixty per cent of the trade of Messrs John Whitehead & Company is "overseas." Mr Newman attributes the success of his company to the fact that they have made a close study of the individual requirements of each country. It is with this object in view in respect to Canadian trade that Mr Newman is undertaking his present visit

Property Rights in News

Merwin Gray Restrained from Using Reports or Information Obtained from Them.

In view of the fact that MacLean Daily Reports, Limited, have applied for an injunction restraining a certain company from copying their reports, or in any way utilizing the result of their labor, the following clipping from a New England paper makes interesting reading

> "Judge Arthur P. Rugg of Massachusetts Supreme Court has issued an injunction against Merwin Gray in a suit brought by the F. W. Dodge Co. of Boston. The defendants in this case were Merwin Gray, et al., the Gray Report Company and the New England Bulletin Company, of Hartford, Conn. The F. W. Dodge Co., who are the originators of the daily building report business, has for many years past been engaged in collecting information relative to new buildings and engineering enterprises, and has expended large sums of money in developing its business throughout the greater portions of the United States.
>
> It is alleged in the bill in equity that the defendant, Gray, who has only recently engaged in this line of business in portions of New England, WHILE WORKING WITH FEW AGENTS AND EMPLOYEES AND UNDER COMPARATIVELY SMALL EXPENSE, WAS OBTAINING COPIES FROM DODGE REPORTS AND USING THE INFORMATION THUS OBTAINED IN REPORTS, WHICH HE WAS NOT ONLY SELLING TO HIS SUBSCRIBERS BUT WHICH HE WAS REPRODUCING AND CIRCULATING IN LARGE QUANTITIES GRATUITOUSLY. When the case came up in court no attempt was made by the defendant to deny the allegations of the bill, and it appearing that the defendant, Gray, was doing substantially as alleged by the plaintiff, it was agreed that a temporary injunction should be issued restraining the defendant, Gray, and his agents from using Dodge Reports or from obtaining any information from them.
>
> "The law on the subject of property rights in news has been firmly established in recent years. The F. W Dodge Co a few years ago was successful in the Massachusetts courts in two suits similar to that brought against Gray, in both of which substantial damages were awarded to them. Subsequently in the United States Circuit Court of Appeals similar decisions were rendered in similar cases."

In asking for similar protection of their rights and property as has been afforded The Dodge Company in the United States, MacLean Daily Reports point out that their service is organized and operated on lines absolutely unlike any other company doing business in this country The news they report is gathered by their own men It is original data collected at their own expense In this way only can dependable, accurate and timely news be obtained

Death of Mr. Peter Lyall

After two days' illness, Mr. Peter Lyall, president of the Peter Lyall & Sons Construction Company, Limited, Montreal, died from heart failure on Thursday, November 14th, at his residence, 145 Bishop street, Montreal, aged 71. Mr. Lyall was the head of the largest contracting firm in the Dominion, which has erected some of the very finest buildings in Canada. In addition to being a successful business man, he was a citizen who took a wide interest in public questions affecting political, civic, and philanthropic movements.

By birth, he was a Scotchman, having been born in Castletown, Caithness, and after learning the trade of a stonemason came to Canada. He settled in Montreal and began business under his cousin, the late Mr. Peter Nicholson. Six years later he commenced on his own account, together with his sons, one of whom, Mr. Peter Lyall, Jr., is now in Winnipeg with another company. Two sons, William and Traill, are still connected with the Montreal firm. The business prospered in a marvellous way, and Mr. Lyall became the largest individual contractor in this country. Recently the firm was turned into a limited liability company.

The late Peter Lyall

Many of the most notable buildings in Montreal were constructed by the firm, these including the Quebec Bank Building, the Royal Victoria Hospital, the Macdonald Engineering Buildings at McGill, the Sun Life Building, the Canada Life, the Grand Trunk General Offices, the Coristine Building, the Board of Trade, the Stock Exchange, Guardian Life, and the Dominion Express and Transportation Buildings. Mr. Lyall also built the sheds of the Montreal Harbor, in addition to many manufacturing plants. Probably the most important work outside the city was the Saskatchewan Parliament Buildings, Regina.

Mr. Lyall was interested in many local enterprises, including the Lachine Rapids Hydraulic & Land Company, the Midway Land Company, the Mount Royal Savings Bank, the Laprairie Brick Company, and the National Brick Company. He also took part in civic affairs, and at one time was a member of the City Council. When the civic reform movement was started he strongly backed it up, and was a vice-president of the Citizens' Association. He was an ardent politician on the Liberal side, and stood as a candidate in Montreal, but was defeated. Local charities found in him a very generous supporter.

Personal Mention

Mr. Henry J. Fuller, president of the Canadian Fairbanks-Morse Company, Limited, has been elected a director of the National Trust Company.

Mr. Donald M. McIntyre, K.C., of Kingston, Ont., has been appointed to succeed Judge Leitch as Chairman of the Ontario Railway and Municipal Board. He will take up his duties at once.

Mr. C. A. Dunham, Signal Engineer of the Great Northern Railway, has been appointed Signal Engineer of the Grand Trunk Railway System, this being a new office created Nov. 1. His headquarters will be at Montreal, and he will report to the Chief Engineer.

Mr. F. A. Robertson ('08 Science), who has been in charge at the Toronto office of the cement and reinforced concrete departments of the Canadian Inspection and Testing Laboratories Company, Limited, has severed his connection with the above concern to join the selling forces of the Canadian Cement Company, Limited, of Toronto.

Mr. P. Welch, who secured the contract for the building of the Pacific Great Eastern Railway between North Vancouver and Fort George, recently spent a few days at Newport at the head of Howe Sound in connection with the starting of railway construction. He was accompanied by A. H. Sperry, who will be placed in charge as superintendent of part of the line.

An Important Goderich Industry

One of the progressive firms identified closely with the field of this journal is the Doty Marine Engine & Boiler Company, Limited, of Goderich, Ont., which has lately been reorganized. The personnel of the company is now as follows: president, Mr. Jno. W. Doty, New York City; vice-president and manager, Mr. Fred. W. Doty; chief draftsman and mechanical engineer, treasurer, Mr. J. G. Reinhart; secretary, Mr. Wm. Proudfoot, K.C. Important extensions to the plant have been made recently and extensive improvements are still under way and contemplated. This firm has been known for years as the makers of high class hoisting and marine engines. They are now about to commence manufacturing of the better type of steam boilers. A large erecting shop at their plant is now being especially equipped with machinery for this purpose and within a short time the company will be building boilers up to 8 feet in diameter and weighing up to 15 tons. Changes have been made in practically every department of the works, all designed to promote economy in production.

Mr. F. W. Doty reports gratifying activity, with plenty of orders on hand and in prospect.

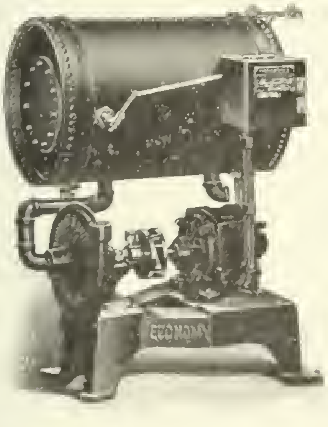
On the 14th September the tile and mantel builders of Montreal went on strike for higher wages. The result was the formation of an association of the masters, which is affiliated with the Builders' Exchange. This association decided not to give any advance, and not to recognize the men's union; in consequence the strike has collapsed and the men have returned to work. Men will be paid according to their ability, and not on a standard.

The Economy Pump and Receiver

There has been such a growing demand for an electrically operated condensation pump that would handle both the hot water and the air that accumulated in a heating system, and one with suction enough to pull the water out of the low places, that several of the most prominent pump builders have given the matter considerable attention.

Prominent among the manufacturers who have devoted much time to experimental work along these lines are Messrs. Thomas & Smith, Inc., heating engineers and pump manufacturers, 116-118 North Carpenter street, Chicago, Ill., who have developed and have been marketing for some time the "Economy" Automatic Condensation Pump and Receiver.

This outfit consists of an expansion tank into which the hot water and air are drawn by vacuum or flow by gravity. The air is discharged automatically and the water is automatically pumped into the boilers by a centrifugal pump, which never loses its prime. A study of the accompanying illustration will give a very good idea of the compactness of the equipment.



Economy Pump and Receiver

The manufacturers claim that they can handle ten thousand feet of radiation on less than one horse power.

This company is represented in Canada by Mr. J. J. Martindale, Mail Building, Toronto.

Sewage Disposal by Incineration

In the absence of sewers, the disposal of sewage is a problem which has to be faced, and which many have found very difficult to satisfactorily solve. Apart from isolated houses, there are many buildings such as hospitals, farms, schools, camps and hotels, where a good system is necessary, for everyone is aware of the extreme danger arising from the collection of sewage in cesspools. Providing that the cost is reasonable, there can be no more efficient method of sewage disposal than incineration, as the waste products are absolutely destroyed.

The Standard Ideal Company, Limited, of Port Hope, Ont., are the manufacturers of three types of incinerators, one adapted for private houses, summer houses, farms and small institutions; another for sanitariums, schools, factories, lumber and mining camps; and a third for the disposal of garbage. Type No. 1 can be used either for toilet or garbage purposes. In No. 2 type the incinerator is so constructed that an initial section can be installed first and then as occasion may require, other sections can be added. The sections, too, are easily separated should it be desired to transport the incinerator.

A point to be emphasized is that all vapors or gases generated by the incineration must pass through the fire before reaching the chimney on draft stack, insuring perfect deodorization. Thus any unpleasant smell is impossible. At the completion of the operation nothing is left but a little dry ash, which is dumped into the fire by means of a lever.

The operating expenses are small. The incinerators are in extensive use in the United States, where they have been adopted by the Government. Many are installed in hospitals, and in other institutions where the efficient disposal of sewage is recognized as essential.

Belliss & Morcom Engines

The London Times of October 2, 1912, is devoted to the industrial history and development of the city of Birmingham. In this connection some interesting particulars are given concerning Messrs. Belliss & Morcom, Limited, for whom Messrs. Laurie & Lamb, of Montreal, are the Canadian agents. Belliss & Morcom products are well known in Canada, especially among readers of this journal. The firm's works were founded half a century ago by the late Mr. Geo. E. Belliss, who in 1884 was joined by Mr. Alfred Morcom, who then gave up a position in the British navy to enter commercial life. The naval experience of Mr. Morcom had the effect of directing the energies of the firm into the sphere of marine engineering, but this is now an auxiliary department as the enormous development of the special engines and condensing plants for electric power, lighting, traction, mill work, etc., fully occupy the resources of the company. The company's plant, which is described in detail by the Times, is one of the best equipped of its kind in the United Kingdom. A feature of the plant is a special testing department where the final trials of all the company's engines are made, after which they are thoroughly overhauled for the correction of any small defects. The advantages claimed for the Belliss & Morcom engines are low cost, simplicity, reliability, durability, high efficiency and minimum maintenance.

An interesting article is contributed to this issue of the Times by Professor F. W. Burstall, who undertakes a general survey of "Birmingham and Engineering." In the course of his article Professor Burstall makes the following observation:

"With the general introduction of electric lighting came the need for a quick speed engine, and many engines were devised to meet this particular need. Practically one type has superseded the others, that being the quick revolution forced lubrication engine invented by the late Alfred Morcom, of Messrs. Belliss and Morcom, and now to be found in all parts of the world. This firm have also taken a leading part in the introduction of the exhaust turbine to effect economies on existing reciprocating engines; and they are developing the large air compressor which is still so widely used in mines despite the spread of electricity for mining purposes generally."

Belliss engines are used extensively and increasingly throughout the Dominion of Canada. They are installed at the city power stations of Montreal, Verdun, Westmount, Farnham, Brockville, Renfrew, Edmonton, Lethbridge, Regina, North Battleford and Wetaskawin. Of the universities and technical schools where they may be seen the best known are McGill University, University of Toronto, Queen's University, the University of Saskatchewan and the Montreal and Quebec Technical Schools. The industrial concerns using Belliss & Morcom's engines include the Dominion Coal Company, Nova Scotia Steel & Coal Company, Edward Partington Pulp & Paper Company, Dominion Textile Company, Frost & Wood Company, Canadian Locomotive Company, Chatham Gas Company, Martin Bennett Asbestos Mines, Ltd., and Johnson's Company.

Belliss turbines are on order for the Canadian Light & Power Company and the city of Calgary.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Arthur, Ont.

Members of the Wellington County Council will advocate the purchase of a road making machine. County Clerk, James Beattie, Fergus.

Berlin, Ont.

Tarvia pavements on Park street from William to the boundary and on Allen street Work is under consideration. Mayor, W. H. Schmaltz. Clerk, A. H. Miller.

Edmonds, B.C.

Roads and sidewalks to cost $300,000 planned for The Municipality of Burnaby. By-laws were passed authorizing municipality to borrow $250,000 for street and road improvement, also $50,000 for sidewalks.

Edmonton, Alta.

Paving, concrete curb and gutter planned by City Council. Clerk, F. M. C. Crosskill. Engineer, A. J. Latornell. Tenders will be called for shortly.

Hamilton, Ont.

Grading to cost $40,000. City Council has authorized grading of base line. Work to be done by day labor next spring. Mayor, Geo. H. Lees. Engineer, A. F. Macallum, City Hall.

Kerrisdale, B.C.

Paving. Councillor Richardson will introduce by-law providing for permanent paving on Bridge street between 16th avenue and King Edward avenue.

Ottawa, Ont.

Boilers. Clerk, Jno. Henderson. Tenders will be received by engineer, N. J. Ker, for two boilers for thawing out purposes for the Waterworks Department.

Rochester Twp., Ont.

Drainage system to cost $8,000. Twp. Clerk, M. N. Mousseau, Woodslee, Ont. Ratepayers to vote on by-law shortly.

St. John, N.B.

Tenders called for excavating a trench for water extensions in De Mont Street West, St. John, and building a shed on Quinn Wharf. Commissioner of Water and Sewerage, R. Wigmore. Engineer in charge, Wm. Murdock, City Hall.

Toronto, Ont.

Sewer system, cost $384,307, recommended by the Board of Control. Mayor H. C. Hocken. Commissioner of Works R. C. Harris. The Commissioner recommends sewerage for Division No. 1, Ward No. 7. This will include necessary manholes, gulleys, private drains, and storm water stand by tank, to be located corner Keele and Bloor streets, the latter to cost about $111,000.

Winnipeg, Man.

Sewer castings. 600 manhole grates for sewer openings. Specifications at Engineer's office. Tenders received by Board of Control, Secretary, M. Peterson. Engineer, H. N. Ruttan, 223 James avenue.

Sewerage filtration plant planned for Rural Municipality of St. Vital. Sec., G. J. Charette. Will purchase 5 acres of land as suitable location. By-law will be submitted in December providing $250,000 for extensions to water and sewer service.

Paving for Rural Municipality of Kildonan. Sec.-treas., Harry Thompson, 215 Chambers of Commerce, Winnipeg. By-law will be submitted shortly for paving Main street from city limits to northern limits of Kildonan.

CONTRACTS AWARDED

Hamilton, Ont.

Grading (extension) of Beach avenue. Mayor, Geo. H. Lees. General contractor, E. Goodale, 98 Aikman avenue, at 65c. per yard.

Toronto, Ont.

Tile pipe sewers. Board of Control. Mayor, H. C. Hocken. Commissioner of Works, R. C. Harris. Contracts awarded to National Contracting Co., 155 Lee avenue, Lane 1st north of Queen street, $478; W. J. Haynes, Dupont street, Beaver avenue, $528; M. H. Murphy, Earlscourt avenue $1,863; Dunne & Co. Brockton Place, $525; Grant Contracting Co., 50 Front street E., Nairn avenue, $2,575.

Vancouver, B.C.

Water meters. Clerk, Wm. McQueen. Contracts were awarded as follows: 1 3-in. to The National Meter Co. 20 2-in. to The Robertson Godson & Co; 12 1½-in. to The National Meter Co.; 10 1-in. to The Robertson, Godson & Co.; 6 ¾-in. to The Robertson, Godson & Co.; 10 ¾-in. to The Carter, Dewar, Crowe Co.

Paving, cost $253,128, Westminster Rd. Clerk, N. McQueen. Engineer, F. Fellowes. Contracts were awarded to the B. C. Paving Co. for granitoid and V. L. McAdam Co. for wood block paving. Half of road to be paved with each kind.

Welland, Ont.

Sewer, cost $5,446.90. Mayor, G. Sutherland. General contractors, W. G. Somerville & Sons. 825 ft. 24-in. double strength vitrified sewer pipe, three manholes, four catch basins.

Winnipeg, Man.

Excavation for pipe line (to New Wells). Engineer, H. N. Ruttan, 223 Jane avenue. Excavation and back filling trench for pipe line 61,000 ft. in length. Board have decided to do work by day labor under direction of engineer. Board of Control. Sec., M. Peterson.

Railroads, Bridges and Wharves

Beiseker, Alta.

Station. G. T. Ry. Branch Lines Company's location of station at Beiseker on its Tofield-Calgary Branch has been approved.

Beaverton, Ont.

G. T. Ry. Company have been authorized to construct siding for Snelgrove & Teer (Beaverton Brick & Tile Co.)

Chisholm, Ont.

C. N. O. Ry. Company's location of station has been approved.

Charlottetown, P.E.I.

Dry dock planned. Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Surveyors are looking over available sites. Work will be done by Government, to start next spring.

Edmonton, Alta.

C. N. Ry. have been authorized to construct spur line for D. R. Fraser & Co., Ltd.

Railroad planned for the Peace River & Great Western Railway. Prov. Sec., A. B. MacDonald. A line is contemplated from Edmonton to Peace River Landing and probably to Dunvegan.

Gananoque, Ont.

Steam railway. Plans have been presented to the Board of Trade for proposed railway line connecting Gananoque with the C. N. R. at Elgin. J. C. Rudd, Morton, Ont., promoter. Plans being considered by transportation Committee.

Lachine, Que.

C. P. Ry. Co. have been authorized to construct spur for N. K. Fairbanks Co., Ltd., on lot 1013, Parish of Lachine, Co. Jacques Cartier, Que.

Montreal, Que.

Railway. C. P. R. Co. have bought right of way and will construct connecting link between their line and the New Brunswick Southern Railway at West St. John, N.B.

Merritton, Ont.

Niagara, St. Catharines & Toronto Ry. Company have been authorized to construct spur for the Interlake Tissue Mills Co., Ltd.

Penetanguishene, Ont.

G. T. Ry. Co. have been authorized to construct spur and siding for the Breithaupt Leather Co. and the Dominion Stove & Foundry Co., Ltd.

Sarnia, Ont.

Siding. G. T. Ry. Co. have been authorized to construct spur for the Sarnia Chain Co.

Swift Current, Sask.

Railway. The C. P. Ry. Company's location of Swift Current Southerly Branch from mileage 45 to 101.30 has been approved.

St. Antoine, Que. (Co. of Vercheres)

Landing pier 227 x 32. Tenders received by Dom. Govt. Dept. of Public

Works, Sec., R. C. Desrochers, Ottawa, until Dec. 11th. Specifications at offices of J. J. Michaud, district engineer, Merchants Bank Bldg., St. James street, Montreal; A. R. Decary, district engineer, Post Office Bldg., Que.; Postmaster, St. Antoine, Dept. Ottawa, and MacLean Daily Reports, Toronto, Ont.

St. John, N.B.

Wharf, Lower Cove, for F. W. Blizard & Co., care F. W. Blizard, 65 Prince William street, St. John. Three wharves to be converted into one 276 x 140 x 100, foundation and facing to be spiles. Plans will be prepared.

Twp. of Hope, Ont., Co. Durham.

Bridge. C. L. O. & W. (C. P. Ry.) Company's plans for proposed bridge to be erected at mileage 128.68 across road allowance between lots 16 and 17, Con. 1, Twp. of Hope, Co. Durham, Ont., has been approved.

Twps. Granthan and Niagara, Ont.

Extension to railway. The Niagara, St. Catharines & Toronto Railway Co. have been authorized to construct railway across 12 highways in Twps. Granthan and Niagara. Gen. Mgr., E. F. Seixas, St. Catharines.

Twp. Louth, Ont. (Co. Lincoln)

Railway (extension). The Niagara, St. Catharines & Toronto Railway Co. has been authorized to construct its Beamsville extension across 5 highways in Twp. of Louth, Co. Lincoln, Ont. Gen. Mgr., E. F. Seixas. St. Catharines.

Thorold, Ont.

Niagara St. Catharines & Toronto Ry. Company have been authorized to construct spur for the Thorold Pulp Co., Ltd.

Toronto, Ont.

Railway construction. A company to be known as "The All Red Line Railway Company," will make application at the next session of Parliament for incorporation. It is the intention of the company to construct a railway from Quebec to Winnipeg with a number of branch lines. Toronto solocitors, Bicknell, Bain, Strathy & MacKelcan, Lumsden Bldg. Ottawa agents, Lewis & Smellie, Trust Bldg.

Trenton, Ont.

C. L. O. & W. Ry. (C P.R.) Co. have been authorized to construct across Front street, Trenton, by means of bridge mileage 88.14 from Glen Tay.

Victoria, B.C.

Railway for Canadian Northern Ry Co Chief engineer, M H. MacLeod, Winnipeg, Man The Provincial Minister of Railways has approved of railway from mileage 100 to 210 near Cowichan Lake through Alberni, New Castle, Nelson and Comox districts.

Vineland, Ont.

G. T. Ry. Co. have been authorized to alter and extend existing siding and construct additional siding for the Vineland Canning Co., on part lot No 23, con. 2, twp. Louth, Co. Lincoln, Ont

Wetaskawin, Alta.

Railway. The Wetaskawin, Yellowhead & Revelstoke Ry Co is to be formed to build and operate railway from Wetaskawin, via the Saskatchewan River, Brazeau River, Rocky River Valley, Yellowhead Pass, Canoe River, Columbia River to Revelstoke, B.C. Solicitors will make application for an act to incorporate company. Solicitors, Messrs- Loggie & Manley.

Whitby, Ont.

Bridge. The C. L. O. & W. Ry. (C. P.R.) Co. have been authorized to construct across Toronto & Eastern Rly.

Winnipeg, Man.

G. T. Ry. Co. have been authorized to construct spur for Thos. Jackson & Son.

Welland, Ont.

G. T. Ry. Co. have been authorized to construct siding commencing north of Port Robinson Station to the premises of the Standard Steel Construction Co., Ltd., Welland.

CONTRACTS AWARDED

Massett, B.C.

Wharf to cost $4,875. Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, W. G. Gillett, 2860 Point Grey Road, Vancouver, B.C. Pile wharf 40 x 80, pile approach 41 x 14.

Montague, P.E.I.

Bridge to cost $6,000. Prov. Govt., Department of Public Works. Sec., L. B. McMillan, Charlottetown. General contractors, W. P. McNeill & Co., New Glasgow, N.S. Piers almost completed; steel work to start about the 20th inst.

Seal River, P.E.I.

Steel bridge to cost $3,200. Prov. Govt., Dept. of Public Works. Sec., L. B. McMillan, Charlottetown. Steel work, W. P. McNeill & Co., New Glasgow, N.S. Work on sub-structure to be done by day labor.

Woodstock, N.B.

Railway bridge (Meduxnakeg Creek). Prov. Govt., Dept. of Public Works, Valley Ry. for St. John. Sec., D. B. Winslow, Fredericton, N.B. General contractors, Kennedy & MacDonald, Woodstock. 300 ft. long.

Public Building, Churches, Schools, etc.

Charlottetown, P.E.I.

Rifle range planned by the Dom Govt. Dept. of Militia & Defence. Sec., E. F. Jarvis, Ottawa. Plans are to be prepared. Work will start next spring.

Dartmouth, N.S.

Post Office. Dominion Government, Dept. of Public Works, contemplate erecting a new structure here Secretary, R C Desrochers, Ottawa

Dundas, Ont.

Alterations and aditions to barracks for Salvation Army Tenders received by Adjt. Miller, S. A Headquarters, Toronto. 10 ft. extension on King street, citadel front; rear addition 37 x 12. White sand brick or cement block construction

Guilds, Ont.

Alterations and additions to Methodist Church Further information from R. T Mallory, Guilds Part of wall to be removed and new alcove and pulpit built; new furnace heating system, new windows built and interior decorations made Plans in progress.

Guelph, Ont.

Repairs and alterations to General Hospital to cost $28,000 under consideration. Ratepayers will be asked to vote on by-law in January.

Hamilton, Ont.

Lodge rooms and offices and stores for Royal Templars of Temperance. Spectator Building. Interested, Dr. Emory, c/o Royal Templars. Mayor, Geo. H. Lees, City Hall. Architect, W. A. Edwards, 2 Hughson street south. 3-sty. Plans to be prepared.

Addition to school, Barton street. Secretary, R. H. Foster, City Hall. Chairman, J. W. Lamoreaux, c/o Tuckett Tobacco Co., Queen street N. Architect, A. W. Peene, 2 King street west. 12 room addition. Plans in progress.

Union station is under consideration for Grand Trunk and Canadian Northern Railways. Plans will be prepared.

Hall to cost $60,000 planned (Hughson street N.) for Sons of England Hall, Ltd. Pres., Thomas W. Jutten, City Hall. Sec., Frank Revelle, James and Augusta streets. Architect to be appointed shortly. Work to commence in spring. 3-sty.

Addition to St. Anne's School to cost $20,000 for Separate School Board. Chairman, J. A. Reding, Commercial Chambers, James street. Architect, Robert Clochey, 226 John street S., is preparing plans.

Kingsville, Ont.

Pavilion, cost $3,000. Architects, Crane & Pennington, Boug. Bldg., Windsor. Tenders received by Clerk, Geo. Pearse, until Nov. 25th noon. One storey, 80 x 40, stone and cement foundation, frame construction.

London, Ont.

City Hall planned, Queens avenue and Wellington street. Ratepayers will vote on by-law in January to raise $250,000 for new City Hall.

Addition to armories planned. Dom. Govt., Dept. of Militia & Defence. Sec., E. F. Jarvis. Addition to be fitted up as offices for staff.

Moncton, N.B.

Installing incinerator to cost $10,000. Work is under consideration of City Council (Board of Health), Chairman, Dr. R. L. Botsford, Alma street.

Montreal Oue., Pointe Claire

Post Office planned for Dom Govt., Dept. of Public Works. Sec., R C Desrochers, Ottawa Mayor, J. T. McBride. A committee has been appointed to confer with Postmaster General in regard to a site

Montreal, Que.

Heating equipment for Church for Presbyterian Congregation, 553 Adam St Pastor, Rev R Ballantyne Hot water heating apparatus, complete with radiators, boilers, etc., required

Ottawa, Ont.

Home contemplated for Home for Friendless Women. Secretary, Mrs Geo Greene, 320 Waverley street Site has been purchased and plans will be prepared

Preston, Ont.

Skating rink for Preston Rink Co Interested, F. Bleiler, L. Patterson, R

McWilliams. Tenders received by Mr. Beiler. 216 x 100, concrete foundation, wood frame, steel covering.

St. Catharines, Ont.

School—20 rooms (Broders Annex, Block 53). The secretary has been instructed to look around for suitable site and the school architect will be asked to prepare plans.

St. John, N.B.

Observatory planned for Dom. Govt. Meteorological Service of Canada. Directors—R. F. Stupart, Bloor and Devonshire Place, Toronto, Ont. Site has been purchased and plans will be prepared.

Shelburne, Ont.

Post office site has been chosen on Main street; stone foundation and construction. Plans in progress. Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Architect, J. A. McKenzie, Shelburne.

Toronto, Ont.

School to cost $60,000, Keele and Conduit street. Sec.-treas., W. C. Wilkinson. Architect, F. E. Belfry, City Hall. 2-sty., 12 rooms, brick, tile and fireproof construction, brick foundation, structural steel. Plans in progress.

Addition to Conservatory of Music, 135-41 College street, is contemplated; brick construction. Plans will be prepared.

Home for Fred Victor Mission Board corner Jarvis and Queen streets. Superintendent, Rev. S. W. Dean, 99 Homewood ave. Assistant Superintendent, Rev. A. MacKenzie. Plans in progress.

Vancouver, B.C.

Tenders will be called at once for installation of steam heating system in Dawson School. Clerk, Wm. McQueen.

Post Office to cost $100,000. Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. A site has been purchased at the corner of 15th avenue and Main street on which the sub post office will be erected. Two other sub post offices are contemplated being erected and plans will be prepared.

Welland, Ont.

Sunday School to cost $7,000 considered for Methodist Church Congregation. Sec., C. H. Reilly. Architect not chosen yet.

High School (extension) to cost $25,000, Main street. Sec., W. H. Lowe. Architect not yet chosen but site has been secured.

Twp. of West Flamboro, Ont. (4th con.)

Church will be erected for Methodist Congregation. Sec.-treas., Ira N. Binkley, Greensville, Ont. Architects, Mills & Hutton, Bank of Hamilton Bldg., Hamilton, Ont., have prepared plans.

Winnipeg, Man.

Church planned for the Central Congregationalists, Hargrave and Qu'Appelle. New building will be erected on Vaughan street as soon as present site is sold.

CONTRACTS AWARDED

Chilliwack, B.C.

Fittings for post office. Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, The Vancouver Showcase & Cabinet Works, 632 Howe street, Vancouver.

Charlottetown, P.E.I.

Church to cost $45,000 (Price and Grafton Sts.) for Zion Congregation (Presbyterian). Architect, C. B. Chappell. General contractor, J. M. Clark, Summerside, P.E.I. Heating and plumbing, Stanley Show & Peardon.

Montreal, Que.

Riding School to cost $4,000, Bordeau, for Mademoiselle Viau, 335 Sherbrooke E. Builder, H. L. Desaulnier, 1475 Papineau. 1-sty., 50 x 67, cement foundation, brick veneer construction.

City Hall Annex. Architects, Marchand & Haskill, 164 St. James street. General contractors, Peter Lyall & Sons, Transportation Bldg. Iron and steel, National Bridge Co. of Canada, Ltd., Longue Pointe avenue. Roofing, Sibley & Huot, 77 Duke street, Montreal.

Regina, Sask.

Ladies College to cost $100,000, 16th avenue, for Anglican Synod. Architect, Storey & VanEgmond, Northern Bank Bldg. General contractor, J. G. Mitchell

Taber, Alta.

Moving picture theatre to cost $8,000 for C. E. Judson. 1-sty., 25 x 125, brick veneer construction, cement foundation. Contracts not yet awarded. Plans in progress.

Toronto, Ont.

Equipment for schools. Board of Education. Sec.,treas., W. C. Wilkinson. Electric wiring, Manning avenue school, Hall and Dollery Electric Co., 848½ College street, $122.00. Cabinet work, various schools, Diesenroth Contracting Co., 75 Yonge street, $2,540. Commercial desks, Bolton avenue and Dufferin street schools, Can. Office & School Furniture Co., 5 Wellington street west, $684.60. Manual training benches, Deisenroth Contracting Co., 75 Yonge street, $60. Lumber for portable building, Duke of Connaught School, R. Laidlaw & Co., Traders Bank Bldg., $837.07. Cabinet work, Harbord Collegiate Institute, Simpson Planing Mill Co., foot Spadina avenue, $175. Seats for Assembly room, Oakwood High School, Geo. H. Hendry Co., Ltd., 215 Victoria street $1,125. Gasoline storage system, garage, Davenport road, National Equipment Co., Ltd., 21 Lombard street, $247.

School, Malvern avenue. Architect, F. E. Belfry, City Hall. Roofing, Geo. M. Bryan, 524 Yonge street, $1,600. Heating and ventilating, Purdy, Mansell, Ltd., 63 Albert street, $7,716. Board of Education. Sec.-treas., W. C. Wilkinson.

Vancouver, B.C.

Church to cost $3,000 for The Congregation of the Beaconsfield Methodist Church. Architects, Horel & Roberts, Dom. Trust Bldg. General contractor, A. L. Ramage, 1350 6th avenue E. Frame construction; seating required.

Winnipeg, Man.

Mission House to cost $15,000, for the Francisca Nuns, 139 Jarvis avenue. Architect and general contractor, A. B. Desrochers, c/o owners. 2-sty., 43 x 29, stone foundation, brick construction. Excavation started.

Business Buildings and Industrial Plants

Berlin, Ont.

Addition to boot factory, Victoria St., for The Berlin Felt Boot Co., Waterloo street. 3-sty. Plans in progress.

Mausoleum under consideration for The International Mausoleum Co., 36 King street E., Toronto. General manager, Frederick F. Lamphier. Plans will be prepared.

Cobalt, Ont.

Cyanide plant, cost $20,000, for The Porcupine Gold Mining Co., head office New York, N.Y. The directors will install a cyanide plant for the treatment of ore at their Vipond mine. Further information from head office or Superintendent of Vipond Mine.

Edmonton, Alta.

Addition to store to cost $125,000, for The Hudson Bay Co. 6-sty., 50 x 100, top storey to be used as restaurant. Plans ready. Work to start shortly.

Warehouse to cost $70,000 for The Hudson Bay Co., 609 3rd street. 6-sty. and basement, 50 x 150. Plans ready; foundations in.

Guelph, Ont.

Car manufacturing plant is under consideration. Pres., L. H. Piercy, Detroit, Mich. Vice-president, John McHardy, Guelph. Sec.-treas., H. F. Slater, 518 West Marion street, Toronto. Company has been formed to manufacture gaso-electric cars.

Hamilton, Ont.

Ice cream factory to cost $10,000 for Burke Bros., Mulberry and Railway Sts. Architect, J. A. Ames, Federal Life Bldg. Tenders received by architect. 2-sty., 50 x 28, cement foundation, reinforced concrete and structural steel construction.

Lethbridge, Alta.

Flour mill planned for The Taylor Milling Co. Pres., John Taylor. Capacity 3,000 bbls. per day. Company will ask City Council to grant free site, exemption from taxation, etc.

Moncton, N.B.

Factory to cost $250,000, for Standard Clay Products Ltd., St. Johns, Que. Director, Geo. McAvity, King street, St. John, N.B. Machinery required, development of clay deposits. Plans will be prepared.

Drain pipe factory, cost $200,000, for the Standard Drain & Pipe Company, St. Johns, Que. Representative, Mr. Trotter. Plans in progress.

Montreal, Que.

Shoe factory is under consideration at Aird & Ernest streets, Maisonneuve, for R. Wilson, Dominion Express Bldg., Montreal. 4-sty., 245 x 45, mill construction. Plans will be prepared.

Nanaimo, B.C.

Hotel to cost $25,000, for Ald. Bushby. 3-sty., brick construction. Plans are being prepared for hotel to be erected on site of present Eagle Hotel.

Nelson, B.C.

Brewery to cost $50,000, for The Fritz Steiner Brewing & Malting Co., Ltd. Pres., A. S. Horswill. Solicitor, T. A. Robley, c/o The B. C. United Agencies. Sec.-treas., W. E. Ketchen. 3-sty., brew house, 27 x 27, brick and concrete construction, cellars, 33 x 50. Plans in progress.

Port Arthur, Ont.

Store and office building to cost $40,000, Bay and Algoma streets, for The

Alberta Land Co. Engineer, H. J. Powers. 2-sty., 150 x 140. Plans in progress.

Regina, Sask.

Implement warehouse and offices to cost $60,000. The Huber Mfg. Co., Marion. Ohio, have applied for 10 lots in Blk. 137 on which they will erect warehouse.

Hotel to cost $1,000,000, Albert and 16th avenue, for G. T. P. Ry. General manager, Mr. Donaldson. Architects, Ross & McFarlane, Belmont street, Montreal. 9-sty., 160 x 160, modern construction and equipment throughout. Plans are not yet completed.

St. John, N.B.

Remodelling bank and office building, Prince William and Church street, for Merchants Bank of Canada. Manager, J. F. Shreve, 58 Prince William street. Architect, F. Neil Brodie, 42 Princess St. Elevator to be installed. Plans in progress.

Taber, Alta.

Bank building to cost $30,000 planned for Canadian Bank of Commerce. 2-sty., brick veneer construction, cement foundation. Excavation started. Contracts not yet awarded.

Toronto, Ont.

Stores, 6-sty., brick construction, Yonge and Shuter streets, for Ryrie Bros. Sec., Harry Ryrie, 134 Yonge St.

7 stores and apartments to cost $14,000, Queen street west, for P. Shulman, 37 Grange avenue, builder. Architect, Isadore Feldman, 199 Yonge street. 2-sty. and basement, stone foundation, brick construction. Plans drawn.

Car barns under contemplation at Morton Rd. and Gerrard street E. Commissioner, R. C. Harris. Mayor, H. C. Hocken. Plans will be prepared.

Stables to cost $4,000. Owner and builder, Batts Ltd., 374 Pacific avenue. 2½-sty., cement foundation, brick construction. Plans drawn.

Factory for Wm. Neilson Ltd., 277-307 Gladstone avenue. Brick addition to be erected in spring. Plans in progress.

Store and residence to cost $6,500, for D. Lavine, 182 Beverley street. Architect, S. A. Waggett, 61 Bleecker street. Brick and stone construction, brick foundation. Plans drawn.

Private hotel to cost $60,000, for Knights of Columbus. Sec., Edward Johnson, 582 Sherbourne street. Plans in progress.

Garage to cost $8,000, Alice street, for T. Eaton Co., 190 Yonge street. 1-sty., 100 x 100, brick and cement foundation, brick construction. Plans drawn.

Vancouver, B.C.

Office building contemplated for the Dominion Bank Company have purchased site at the corner of Granville and Dunsmuir streets. Plans will not be completed for some time.

Store and office building to cost $55,000, Helmcken and Granville, for Mr. Jas. Borland, 1934 Nelson street. 1-sty. pressed brick construction. Plans prepared. Tenders will be called at once.

Warehouse to cost $75,000, Bridge and Beattie for J. W. Gibb, 1273 Nelson St. Architects, Parr MacKenzie & Day, Vancouver. Excavation contractors, M. P. Cotton & Co., 198 Hastings street west. 5-sty., concrete and mill construction. Tenders being received by architect for general contract.

Office building is planned (Granville and Dunsmuir Sts.) for Union Bank of Canada to be erected on site recently purchased when lease expires.

Victoria, B.C.

Hotel to cost $60,000, Foul Bay, for Messrs. Butler, Stuart, Campbell & Craddock (in trust). Architects, Butler & Harrison have prepared plans. Tenders to be called soon.

Welland, Ont.

Cotton bag factory for Bemis Bag Co., Boston, Mass. Site has been purchased and plans will be prepared.

Winnipeg, Man.

Agricultural implement plant, St. Boniface, for The William Galloway Co., Waterloo, Iowa, U.S.A. Site has been purchased in Rue des Meuron. Buildings will be erected next spring.

Stable will be erected for the Crescent Creamery Co. President, R. A. Rogers. Brick construction, to accommodate 144 horses. Plans prepared.

Storage shed for the Breen Motor Co., Broadway and Sherbrooke street. 50 x 50, corrugated iorn construction to be in rear of present building. Plans prepared.

CONTRACTS AWARDED

Brantford, Ont.

Dry kiln (S. Market) for Massey-Harris Co., Ltd. Supt., Franklin Grobb. Builder, A. J. Cromar, 448 Colborne St. 1-sty., 38 x 22, cement foundation, tile, sand lime, brick reinf.

Calgary, Alta.

Warehouse to cost $15,000 (4th St. W.) for Robin Hood Flour Mills. Architect, Engineering Dept. of Company. General contractors, Carter, Halls, Aldinger Co., 7th avenue and 1st street west. 3-sty., 72 x 47, frame, cement foundation.

Stores to cost $7,000, 8th avenue west, for Goodison, Hicks & Maylew. Architect, J. G. Teague, Dominion Bank Bldg. General contractors, Rutty & Weare, 314 Underwood Block. 2-sty., 50 x 100, brick, cement foundation.

Stores to cost $15,000, 1st street west for F. G. Wooley Dod. Architect, R. E. McDowell, Devenish Apts. General contractors, Jones & Lyttle Ltd. 1-sty., 50 x 70, brick construction, cement foundation.

Charlottetown, P.E.I

Remodelling store to cost $7,000, for Moore & McLeod, Queen street. Architect, C. B. Chappell. General contractors, H. & S. Lowe. Store fronts, plate glass, fixtures.

Copper Cliff, Ont.

3 camp buildings to cost $14,175, for Canadian Copper Co. Ltd. Pres., A. P. Turner. Architect, H. W. Angus, North Bay. General contractors, Henderson & Angus, North Bay. 1½-sty., 11 ft. 6 in. x 31 ft. 6 in., stone foundation, frame construction.

Fort William, Ont.

Elevator to cost $20,000, Pacific Ave. for N. M. Paterson. Architects and general contractors, Hegland & Star, Minneapolis. 12 x 12, reinforced concrete construction, galvanized iron roofing.

Manufacturing plant to cost $100,000. Montreal street, for The National Tube Co. Pres., W. W. Near. Architect, owner. General contractor, M. H. Braden. 7 buildings, solid brick and structural steel construction.

Bank to cost $40,000, Victoria avenue, for Merchants Bank of Canada. Architect, Carl Wirth. General contractors, Seaman & Penniman. 2-sty., 50 x 76. Bedford stone and pressed brick construction.

Bedding factory to cost $40,000, Vickers avenue, for McKellar Bedding Co., Berlin, Ont. Architects and general contractors, Seaman & Penniman. 3-sty., 113 x 62, reinforced concrete construction.

Starch works, Island No. 2, for G. T. Benson, care Edwardsburg Starch Company, Ltd., 46 London & Lancashire Bldg., Montreal. Builders, Canadian Stewart Co., Fort William. Seven buildings, covering 700 ft. by 250 ft., including grain elevator, 6 tanks. Cement foundation, reinforced concrete, frame and brick construction. Excavating started.

Oil plant, cost $7,000, C. P. R. property, for Pintoch Compression Co., New York. Representative, Mr. Pearson, Avenue Hotel. Architects, owners. General contractor, R. E. Wright. Two storeys, 34 x 28, brick construction.

Moncton, N.B.

Woollen mill, Church street, for Humphreys Unshrinkable Underwear Limited. Manager, J. K. MacDonald. Architect, H. H. Mott, Germain street, St. John. General contractor, S. O. Humphrey, 147 St. George street, Moncton. Two stys., 100 x 68, cement foundation, brick construction.

Montreal, Que.

Office building, cost $1,000,000, St. John and Hospital streets, for W. F. Lewis Estate, 30 Hospital street. Architect, K. G. Rea, 54a Beaver Hall Hill. General contractor, E. G. M. Cape, Beardmore Bldg., 59 Peter street. Ten storeys, 120 x 100, fireproof construction, Ohio sandstone facing.

Store and residence, cost $4,200, St. Laurent. Owner and builder, Aldas Duquetter, 3136 St. Laurent. Three storeys, 25 x 58, brick veneer construction, cement foundation. Excavating started.

Store and residence to cost $8,200, 226 St. Hubert. Owner and builder, A. Clouthier, 2558 Chateaubriand. 3-sty., 50 x 62, brick veneer construction.

Store and residence to cost $6,000, St. Catherine, for J. T. Valette, 60 Ontario street E. General contractors, Michel Bourdon & Fils, 527 Panet. 3-sty., 25 x 55, pressed brick, cement foundation.

Office building to cost $500,000, 107 St. James street, for Royal Trust Co., Transportation Bldg. Architects, McKim, Meade & White, c/o Mr. Webster, New Birks Bldg. General contractors, Can. Norcross Co., New Birks Bldg. Roofing, Sibley & Iliot, 77 Duke street, Montreal.

Bank and office building to cost $429,000, St. James street, for Bank of British North America, St. James street. Architects, Barrot, Blackader & Webster, New Birks Bldg. General contractors, Can. Norcross Co., Birks Bldg.

(Continued on page 71)

Tenders and For Sale Department

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

Tenders for Harbor Improvement

Sealed tenders will be received by A. O. Powell, Harbor Engineer for the City of New Westminster, B.C., at his office, 511-514 Westminster Trust Building, until two o'clock p.m., **Monday, December 2, 1912,** for upwards of three thousand lineal feet of cedar pile quay wall construction, and one million cubic yards of back filling with rock revetted slope. Plans and specifications may be examined at engineer's temporary office at Room 22, 26 Lorne street, New Westminster, on and after November 18. Further particulars upon application. 47-96

Tenders Wanted

Sealed tenders will be received by the undersigned until noon on **Friday, December 6th,** for

The Construction of a Building for the Avonmore Rural Continuation School District

The Building is to be completed by November 1st, 1913

Plans and specifications can be seen at the offices of the Secretary Treasurer and of

C. P. Meredith,
Architect, Ottawa

Tenders to be accompanied by certified cheque for ten per cent. of the amount of tender, which will be forfeited should the contractor fail to sign contract.

Lowest or any tender not necessarily accepted.

A. O. MILLER, Sec.-Treas.,
Avonmore, Ont.

47-79

Sealed Tenders

are invited by the Town of Kingsville for $10,000 worth of Debentures bearing interest at five per cent. payable in ten equal annual installments of principal and interest. Tenders to be in the Clerk's hands by 6 p.m. on **December 2nd, 1912.**

GEORGE PEARSE,
Town Clerk.
47-97

Tenders Wanted

The Town of Hanover desire tenders for the laying of about 6555 feet of 4-inch water mains, and about 2640 feet of 6-inch mains, with Valves, Tees, Hydrants, and all necessary connections, on certain streets of the Town of Hanover. The Corporation to supply necessary material. Depth of trench to be at least 5 feet above top of main. Specifications, streets on which work is to be done and any other information may be obtained from the Town Clerk. Tenders received up to 7 o'clock p.m., **27th November, 1912.**

The lowest or any tender not necessarily accepted.

JOHN TAYLOR,
Town Clerk.
47-1

Mail Contract

Sealed tenders addressed to the Postmaster General will be received at Ottawa until noon on **Friday, the 13th of December, 1912,** for the conveyance of His Majesty's Mails on a proposed Contract for four years, six round trips per week over Rural Mail Route from Kettleby, Ont., to commence at the pleasure of the Postmaster General.

Printed notices, containing further information as to conditions of proposed Contract may be seen and blank forms of tender may be obtained at the Post Offices of Kettleby, Glenville and at the office of the Post Office Inspector at Toronto.

Post Office Department, G. C. ANDERSON,
Mail Service Branch. Superintendent.
Ottawa, October 29th, 1912. 45-47-77

Mail Contract

Sealed tenders addressed to the Postmaster General, will be received at Ottawa until noon, on **Friday, the 20th of December, 1912,** for the conveyance of His Majesty's mails on a proposed contract for four years, six times per week, over Rural Mail Route from Newmarket, Ont., to commence at the Postmaster General's pleasure.

Printed notices, containing further information as to conditions of proposed contract may be seen and blank forms of tender may be obtained at the Post Office of Newmarket, Glenville, Holland Landing, and at the office of the Post Office Inspector at Toronto.

G. C. ANDERSON,
Superintendent.

Post Office Department,
Mail Service Branch,
Ottawa, November 4th, 1912. 46-48-88

Extension of Time

Water Commission of the Town of Dunnville

Notice is hereby given that the time for receiving proposals for the installation of a turbine pump for the Town of Dunnville, has been extended to 9 p.m., **November 28, 1912.**

ALAN MAIR JACKSON, Superintendent.
47-2 P. O. Box 196, Dunville, Ont.

Debentures for Sale

The Corporation of the Town of Steelton will receive offers up to 8 o'clock p.m., **December 3rd, 1912,** for the purchase of the following debentures:

$7,000 Public School Debentures.

$9,000 for the purchase of property for park purposes.

$15,500 for the construction of a macadam pavement.

Full particulars on application to

J. ROBINSON,
Clerk, Steelton, Ont.
46-48-91

To Contractors

Tenders will be received by the undersigned up to twelve o'clock noon, **Tuesday, November 26th,** for demolishing the brick building and addition on the grounds of the Ontario Jockey Club known as Woodbine Park Hotel, Queen street east. Contractors are required to state the amount for demolishing the buildings, also allowance for taking and removing the material therefrom—all debris caused by the demolishing to be dumped in the excavated portion of the building. The lowest or any tender not necessarily accepted.

For further information apply to

The Secretary,
ONTARIO JOCKEY CLUB,
6 Leader Lane.
46-47-93

Representatives Wanted

One of the largest firms in the United States manufacturing water meters desires to secure representatives in Eastern and Western Canada. Only firms or individuals having good connections with municipal authorities and town and city engineers are desired. Write giving particulars to Box 637, Contract Record & Engineering Review, Torpnto. 45-47-76

Wanted—Town Engineer

for the Town of NEW GLASGOW, N. S.

Applications will be received bp the undersigned, for the position of Town Engineer, from persons who must be fully qualified and competent to take charge of all branches of town work. Applicants will please state salary, give experience, particularly in permanent street building and in hydraulics, and furnish testimonials.

JOHN UNDERWOOD, Mayor.
JAMES ROY, Town Clerk.
46-47-95

CITY OF EDMONTON

Engineering Department 1913

Sealed tenders, addressed to the undersigned, and endorsed "Tenders for Paving, 1913," will be received at the office of the City Commissioners, Edmonton, Alberta, until 12 o'clock noon on **December 10th, 1912,** for approximately 400,000 sq. yards of Asphalt and Bitulithic Pavement.

Plans, specifications and all information may be obtained at the office of the City Engineer, or plans and specifications are on file at the office of the Contract Record & Engineering Review, and the Canadian Engineer, Toronto.

Companies wishing to tender on Asphaltic concrete pavement submit their own specification, with tendered prices.

A deposit fee of Fifteen Dollars ($15) is required when plans and specifications are taken away. This fee will be refunded, provided that the plans and specifications are returned within ten days after closing of tender.

An accepted cheque for the amount of Five Thousand Dollars ($5,000) must accompany each bid.

The lowest or any tender not necessarily accepted.

CITY COMMISSIONERS,

Office of the City Commissioners,
Edmonton, Alta., Nov. 6, 1912 47-49-3

Board of Education

Toronto

Sealed tenders, whole or separate, addressed to the Secretary-Treasurer of the Board, will be received until

Friday Noon, November 29th, 1912

for the following trades required in the erection of

New School Building, Keele St.

Masonry and Steel, Carpentering, Plastering, Painting, Roofing and Tinsmithing, Fireproof Flooring, Iron Stairs

New School Building, Pauline Avenue

Plumbing, Heating and Ventilating, Heat Regulation, Wiring

Enlargement of Malvern Ave.

Painting, Fireproof Floors, Plumbing, Wiring

Enlargement of Western Ave.

Plumbing, Heating, Wiring

and for

Oakwood High School Cabinet Work

Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, City Hall. Each tender must be accompanied with an accepted bank cheque for five per cent of the amount of tender or its equivalent in cash. Tenders must be in the hands of the Secretary-Treasurer at his office in the City Hall, not later than 12 o'clock noon on the day named, after which no tender will be received. The lowest or any tender will not necessarily be accepted.

W. W. HODGSON,
Chairman of Committee.

W. C. WILKINSON,
47-4 Secretary-Treasurer.

Agents Wanted

Large United States manufacturer desires to appoint agencies in Canadian territories, where not already represented, for the best line of Concrete Waterproofing coatings made. Attractive proposition. Box 621, Contract Record, Toronto, Ont. 12-53-T.F.

Wanted

Locomotive crane or travelling derrick 35 to 50 foot boom. Must be in good condition. York Sand & Gravel, Limited, East Toronto, Ont. 47-50-99

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. 11-t.f. Toronto, Ont. 46-94

Situations Vacant

WANTED—Draughtsman able to make reinforced concrete drawings and calculations. State salary. Prack & Perrine, Hamilton, Ont. 46-47-90

WANTED—Draughtsman with structural and building experience who could make steel calculations. State salary. Prack & Perrine, Hamilton, Ont. 46-47-89

Wanted

One mechanical draftsman with experience on heavy machine design. Also one structural steel draftsman. Apply stating present salary and references to Box 649, Contract Record, Toronto, Ont. 47-98.

Business Buildings and Industrial Plants

(Continued from page 69)

Struc. engr., Can. Westinghouse Co., Victoria Bldg. 5-sty., 97 x 70.

Retail meat store to cost $6,000, Church avenue, for Matthews Lang Ltd., Mill street. Architect, J. Rawson Gardiner, 49 Beaver Hall Hill. General contractor, R. Ryan, 697 Atwater avenue. 1-sty., 60 x 25, cement foundation, stone construction.

Store and residence to cost $6,000, Masson. Owner and builder, E. Meloche, 304 8th ave, Rosemount. 3-sty. 21 x 60, stone construction, stone foundation. Excavation done

Flats to cost $11,400, 42 Overdale. Architect and builder, Geo. Bail, 102 Stadacona. 3-sty., 21 x 80, cement foundation, brick construction. Excavation started

Ottawa, Ont.

Shops and residences cost $11,000 Owners and builders, Cowie & Nore, 302 1st ave., Ottawa. Three storeys, 50 x 60, stone foundation, brick construction

Factory, cost $10,000, Carling ave. Owners and builders, Campbell Steel & Iron Co., Ltd. Several thousand dollars worth of new machinery required

Sackville, N.B.

Steam laundry. Owner and builder, L. C. Carey. 80 x 40, reinforced concrete construction. Foundations in

Toronto, Ont.

Store and residence to cost $4,000, Canning and Pape avenue. Owner and builder, Chas. Martin, 23 Globe avenue. Brick construction and foundation

Laundry, Belmont street, for Toronto Industrial Refuge, 13 Belmont street. Architect, Burke, Horwood & White, 28 Toronto street. Mason, Wm. Strollery, 20 Elgin avenue. 2-sty., 44 x 40, stone foundation, brick foundation.

Garage to cost $3,000, Admiral road, for Z. A. Lash, C.N.R. Bldg, King E. Architect, Eden Smith & Sons, 199 Yonge street. General contractors, T. Fussell & Sons, 406 Dupont street. Brick foundation and construction.

Garage to cost $3,000, Fraser avenue, for Canada Metal Co., Fraser avenue. Architect, F. H. Herbert, 65 Adelaide street E. Mason, H. Needham, 348 Crawford street. Carpenter, Geo. Sparling, 759 Dufferin street. Steel work, Steel & Radiation, Fraser avenue. Ptg., H. W. Johnson, 209 Church street. Cut stone, brick and structural steel construction, cement piers.

Stores and residence to cost $10,000. Owners and builders, Rosenfeld Bros., 572 Annette street. Stone foundation, brick construction.

Vancouver. B.C.

Wood pulley factory to cost $20,000, 465 Dufferin street, for Bissinger & Co. Architects, Parr, McKenzie & Day. General contractor, J. J. Dissette, 570 Granville street. 2-sty., brick construction.

Addition to store to cost $9,000, for Gordon Drysdale Ltd., 575 Granville St. Architect, S. B. Birds, 405 Abbott street. General contractors, Coffin & McLennan, 1701 Broadway W. 3-sty., brick construction.

Winnipeg, Man.

Warehouse to cost $25,000, McPhillips street, for The Radford Wright Co., Ltd., 776 Main street. Architect, C. W. U. Chivers, Keewayden Bldg. General contractors, Nelson & Foster, 273 Higgins avenue. 2-sty., 134 x 192, cement foundation, frame construction.

Residences

Calgary, Alta.

Residence to cost $6,000, Mt. Royal, for Wallace & Hill, 815 13th avenue W. 2-sty., 32 x 36, brick construction, cement foundation. Plans ready.

2 residences to cost $6,000, for J. Howard, 1124 17th avenue W. 1½-sty., 20 x 36, frame construction, cement foundation. Plans ready. Excavating started

Residence to cost $4,000 for Alliance Investment Co., 711 1st street. 2-sty., 21 x 32, cement foundation, frame construction. Excavating started.

Hamilton, Ont.

Residence to cost $7,000, for W. F. Goering, 211 Herkimer street. Architects, Wall & Blackwell, Lister Bldg. Owner will receive tenders; brick foundation

Montreal, Que.

Residence to cost $10,800, St. Denis. Owner and builder, Eustache Courchene, 5 Clairmont. 3-sty., 37 x 57, brick veneer construction. Plans in progress.

Apartment house, Lafontaine, Pare & Papineau avenues, for Messrs. Marquette, Dupre & Lamoreaux, La Patrie Bldg. 6-sty., 160 x 156. Plans being prepared

Ottawa, Ont.

Residence, cost $8,000, for A. M. Davis, 251 Clemow. C. P. Meredith, Sparks street. Three storeys, 36 x 31, brick veneer construction. Plans in progress.

Residence, cost $6,600, for W. H. Boyd, 16 Wustemburg. Three storeys, 26 x 36, brick veneer construction, stone foundation. Plans in progress.

Addition to apartments, cost $7,500, Florence street, for Donald Fraser, O'Connor street. Architects, Horwood, Taylor & Horwood, 130 Sparks street. Brick veneer construction. Plans drawn.

Residences, cost $19,000, 3rd avenue, for F. W. Mulligan, Harbord P. O. 74 x 41, stone foundation, brick veneer construction. Plans in progress.

Two residences, cost $14,000, for James Hill, 55 Carling, Ottawa. 25 x 45, cement foundation, brick veneer construction. Plans in progress.

Residence to cost $7,000 for C. S. Scott, 654 Laurie W., Ottawa. 3-sty., 28 x 40, stone foundation, brick veneer construction. Plans in progress.

Toronto, Ont.

6 pair residences to cost $18,000, N.S. Pendrith avenue. Owner and builder, J. M. Walkey, 326 Shaw street. 2-sty., stone foundation, brick construction. Plans ready.

1 pair residences to cost $5,000, N.S. Shanley street, for Jno. Hines, 693 Gladstone avenue. Stone foundation, brick construction. Plans drawn.

Residence to cost $3,500, Jackman Ave. Owner and builder, J. McGenegal, 63 Hambly avenue. 2-sty., stone foundation, brick construction. Plans drawn.

Residence to cost $6,000, 84 High St., for W. T. Joy, 125 Quebec avenue. Architect, H. E. Hand, Janes Bldg. 2½-sty., brick construction and foundation. Plans drawn.

Apartments to cost $6,000 for Wm. Phillips, Brunswick and Bloor. Architects, Redmond & Beggs, Kent Bldg. 3-sty., brick foundation, brick and stone construction. Plans drawn.

Winnipeg, Man.

Apartment block to cost $150,000, Dorchester and Lilac streets, for The West End Realty & Building Co., Lenore St. and Portage avenue. Mgr., N. Herchenson. Plans not yet drawn. Building to be erected in spring.

CONTRACTS AWARDED

Brantford, Ont.

Residence to cost $10,000, Nelson St., for John Ham, c/o Ham & Nott Co., Elgin street. Architect, L. D. Barber, Temple Bldg., Dalhousie street. Builders, O'Neil & Harper; heating and plumbing not yet let. 2-sty., 48 x 41, stone and cement foundation, pressed brick construction.

Calgary, Alta.

Residence to cost $4,000, for A. R. Tudhope. Builder, A. E. McGinnis, 1619 13th avenue. 2-sty., 27 x 38, cement foundation, frame construction.

Residence to cost $6,000 for Miss N. Romanes, 2511 5th street W. General contractor, H. J. Rowan. 2-sty., 32 x 34, brick, cement foundation.

Residence to cost $4,000, for T. H. Von Montford, 501 David Block. Builder, Consolidated Building Co., 206 David Block. 2-sty., 20 x 34, brick construction and foundation.

Residence to cost $4,000, Elbow Park. Owner and general contractor, A. B. Hummellman, 2416 5th street west. 2-sty., 28 x 35, cement foundation, frame construction.

Copper Cliff, Ont.

7 residences to cost $28,250, for Canadian Copper Co. Ltd. Pres., A. P. Turner. Architect, H. W. Angus, North Bay. General contractors, Henderson & Angus, North Bay. 2-sty., 30 x 28, stone foundation, frame construction.

Hamilton, Ont.

Residence to cost $3,100 for M. Addy, 155 Bellview avenue. General contractor, J. W. Dinkson, Dundas. Mason, Turner Bros., 1066 Cannon street E. 2-sty., concrete foundation, brick construction. Permit issued.

Montreal, Que.

Two residences, cost $9,600, Addington street. Owner and builder, F. Lachapelle, 589 St. Hubert. Two storeys, 50 x 64, cement foundation. Excavation started.

Residence, cost $6,000. Owner and builder, E. Masse, 830 Parthenais. Three storeys, 25 x 55, stone construction, stone foundation. Excavation started.

Residence, cost $3,000, Orchard, for A. N. Cechirii, 237 Boul. Monk. Builder, Dominique Londel, 171 Clovis. Two storeys, 25 x 35, cement foundation, pressed brick construction.

Flats, cost $12,000. Owners and general contractors, Lefebvre & Provost, 34 College. Architect, Macduff & Lemieux, 46 University. Three storeys, 78 x 41, cement foundation, brick veneer construction.

Residence, cost $4,800. Owner and builder, Louis Latulippe, 1098 St. Antoine. Three storeys, 25 x 53, cement foundation, brick veneer construction.

Residence, cost $4,200, St. Antoine. Owner and builder, J. Lemoine, 2006 St. James. Three storeys, 28 x 36, cement foundation, brick veneer.

Residence, cost $6,000, Prudhomme. Owner and builder, Jos. Chevalier, 1449 des Erables. Two storeys, 25 x 52, brick veneer, stone foundation.

Two residences, cost $6,600, Chabot. Owner and builder, Fortuna Pichette, Dorion street. Builder, Albert Broullet, 191 Marquette. Three storeys, 50 x 40, cement foundation, pressed brick construction.

Two residences, cost $10,800, Oxford. Owner and builder, Domina Cusson, 194 Prud'homme. Two storeys, 25 x 68, stone foundation, pressed brick construction. Excavation started.

Residence, cost $12,000, Casgrain. Owner and builder, Denis Magnan, 338 Panet. Three storeys, 68 x 56, stone foundation, brick veneer construction.

Residence, cost $5,200, St. Ferdinand. Owner and builder, Jos. Rozon, 55 Fulford. Three storeys, 38 x 40, pressed brick, cement foundation.

Flats, cost $5,400, for L. Lebaux, 1260 Des Erables. Builder, Oscar Bouchard. Three storeys, 25 x 30, stone foundation and construction.

Residence, cost $4,200, Fullum. Owner and builder, Xavier Parizeau, 312 Champlain. Three storeys, 26 x 25, brick, cement foundation.

Residence, cost $4,200, Bordeaux, for Odilon Duval, St. Alexis street. Builder, Albert Brouillet, 191 Marquette. Three storeys, 23 x 40, stone foundation, pressed brick construction.

Residence, cost $4,800, 127 Hochelaga. Owner and builder, Jos. Cagne, 28 St. Vincent. Three storeys, 25 x 25, brick, cement foundation.

Two residences, cost $8,400, Fullum. Owner and builder, Napoleon Frenette, 287 Fabre. Three storeys, 50 x 56, brick, cement foundation.

Residence, cost $4,800, St. Dominique. Owner and builder, J. Duquette, 2342 Drolet. Three storeys, 25 x 50, brick veneer, stone foundation. Excavation started.

Residence, cost $4,000, Chabot. Owner and builder, Jules Marceau, 1771 De La Roche. Three storeys, 25 x 50, brick, cement foundation. Excavating started.

Two residences, cost $10,800, Regent ave. Owner and builder, R. Ryan, 296 Regent ave. Two storeys, 44 x 38, brick veneer construction, cement foundation.

Seven residences, cost $26,000. Owner and builder, A. Arcand, 219 Cuvillier. 3 storeys, 45 x 199, cement foundation, pressed brick construction. Excavating started.

Residence, cost $4,000, Dorion. Owner and builder, Ed. Papineau, 1071 Cartier. Three storeys, 25 x 40, stone foundation, brick construction.

Residence, cost $4,200, Oxford. Owner and general contractor, Wilfred Gaudette, 291 Amherst. Three storeys, 25 x 72, cement foundation, pressed brick construction.

1 pair residences to cost $6,000, Priest avenue. Owner and builder, G. K. Heaman, 32 Cheltenham street. Architect, P. H. Finney, 79 Adelaide street E. 2½-sty., stone foundation, brick construction.

Residence, Prescott avenue. Owner and builder, A. J. Shewring, 446 Indian road. 2-sty., stone foundation, brick construction.

2 residences to cost $5,000, Algonquin avenue. Owner and builder, A. J. Peppiatt, 81 Hilton avenue. 2½-sty., 26 x 64, brick foundation and construction.

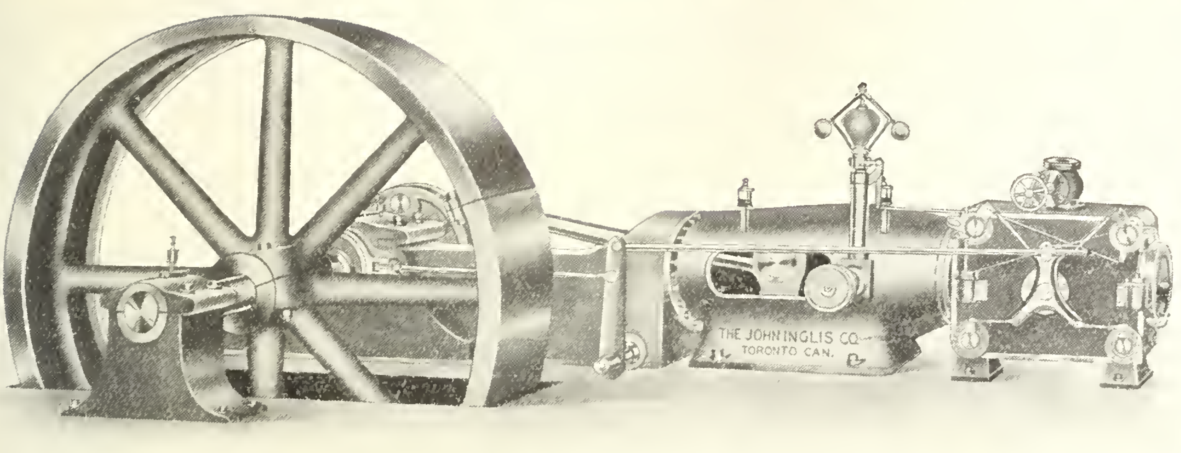
Residence to cost $1,500, W.S. Quebec avenue. Owner and builder, Eaton & Hunt, 37 Quebec avenue. Stone foundation, brick construction.

Residence to cost $4,000, N.S. Geoffery street. Owner and builder, T. W. Todkill, 78 Willcocks street. 2½-sty., brick foundation and construction.

Residence to cost $7,000, High Park Blvd., for Frank Babcock, 294 Indian road. Architect, D. E. Smith, 77 Victoria street. Mason, Purton & Chennells, 246 Albany avenue. Carpenter, Sandall & Head, 1033 Dufferin street. 2½-sty., brick construction, stone foundation, concrete tile.

Two family apartments to cost $7,000. Owner and builder, G. W. Goulding, 106 Victoria street. Brick construction and foundation.

Residence, Gothic ave., for Sturgeon Stewart, 16 Thorold street. Architect, J. A. Harvey, 164 Bay street. General contractors, Milliship & Card, 193 Gil-


THE JOHN INGLIS CO.
TORONTO CAN.

Other People's Opinions Are What Count

Anything we would say about our power plant equipment might be considered biased.

We acknowledge no superiors in the art of building high efficiency pumps, engines and boilers, but we would prefer to let our customers speak for us.

If you wish to instal a complete power plant or a new unit, write us at once, and we will be pleased to submit you names of previous purchasers for reference.

The John Inglis Co., Limited

ENGINEERS AND BOILERMAKERS

Strachan Avenue, TORONTO

[illegible] ave. Two storeys, brick and cut stone construction, brick foundation.

Residence, cost $1,000, Eaton ave. Owner and builder, Sam. E. Pearcy, 3 Upton ave. Brick construction, cement foundation.

Residence, cost $6,000, W.S. Indian Road. Owner and builder, W. B. Charlton, 140 Close ave. 2½ storeys, brick and cut stone construction, stone foundation.

Residence, Bellwoods ave., for Alter & Klung, 63 Beverly street. Builder, M. Blank, 1 Dudley Place. 2½ storeys, brick foundation and construction.

Oak Bay, B.C.

Residence, cost $4,000, St. David's St., for F. M. McConnan. Architects, Rochefort & Sankey. General contractors, Williams, Terise & Williams, 8 rooms.

Regina, Sask.

Apartment block, cost $35,000, 15th ave. Owner and general contractor, S. K. Powell. Architect, S. J. Tripp. Three storeys, 106 x 45, will be modern throughout.

St. John, N.B.

Tenement house, Lancaster, for Harry E. Belyea, care W. Daniel & Co., Ltd., Charlotte street. General contractor, David McPherson, Manawakonish road. Number of houses to be erected. Two storeys, 25 x 50, concrete foundation, frame construction.

Sackville, N.B.

Residence for E. T. Ehrhardt. Builder, Jno. Fillmore. Two storeys, 28 x 22, Work in progress.

Toronto, Ont.

Residence, cost $4,000, Oxford street. Owner and builder, Max Shenfield, 35 Oxford street. Stone foundation, brick construction.

Residence, cost $3,500, Neville Park Blvd., for G. Stevenson, 110 Queen East. Builder, S. A. Waggeth, 61 Bleeker St. 2½ storeys, brick foundation and construction.

Apartments, cost $6,000, Clinton St. Owner and builder, Donnefeld Bros., 164 Evelyn ave. Three storeys, brick construction and foundation.

Winnipeg, Man.

Apartment block, cost $15,000. General contractor, J. Riley, 320 McIntyre Block. Architect, P. C. Samwell, 516 Builders' Exchange. Three storeys, 43 x 29, stone foundation, brick construction. Excavating started.

Two residences, cost $8,000, Lansdowne ave. Owner and general contractor, M. Lightburn, 87 Evanson. Two storeys, 24 x 24, frame construction.

Power Plants, Electricity and Telephones

Georgetown, Ont.

Hydro-electric system is to be installed. Clerk, H. W. Kennedy. Ratepayers passed by-law Nov. 11th.

Nanaimo, B.C.

Generator and engine for the Nanaimo Light Co. General contractors, Taylor & Young, Metropolitan Bldg., Vancouver., for one 450 h.p. "Howden" high speed engine, direct connected to 300 k.w. generator.

Niagara Falls, Ont.

Electric centrifugal pump, cost $5,700. Clerk, W. J. Seymour. General contractor, Canada Foundry Co., Toronto.

Ottawa, Ont.

Power house, cost $8,000, for Ottawa Electric Co., Ltd., Sparks street. 45 x 88, cement foundation, brick construction. Plans in progress.

Port Alberni, B.C.

Electric light plant, cost $20,000, planned by the town council. Engineer, W. Anderson, Vancouver Block, Vancouver, B.C. Work will start as soon as possible.

Wadena, Sask.

Electric lighting system, cost $20,000. Secretary-treasurer, F. M. Mugan. General contractors, the British & American Engineering Co., Winnipeg.

Winnipeg, Man.

Gas plant sheds, cost $4,000, for the C. N. Ry. Architect, R. B. Pratt, company's architect. General contractors, Duncan & McDonald, Steele Bldg. Two storeys, 35 x 114, cement foundation, frame and corrugated iron construction.

Business Notes

Amqui, Que.

Saw mill of D. N. Dube destroyed by fire. Will rebuild.

Blind River, Ont.

Fire destroyed five stores, the post office, a pool room and the Grand View Hotel. Total loss about $50,000.

Bromptonville, Que.

Saw mill of J. Bouffard destroyed by fire, loss $6,000. Will rebuild, machinery required.

Compton, Que.

Dawson Hotel has been destroyed by fire at a loss of $7,000. Plans will be prepared for a new building.

Fraser Mills, B.C.

The Western Canada Lumber Company's eight dry kilns are completely destroyed, loss $100,000. Will rebuild.

Hanley, Sask.

Stores and offices of the Consumers Supply Co. burned; guilding 40 x 90, 1 storey, loss $5,000. The Dominion Bank, two offices, one storey, 24 x 30, frame, $800, and the other $500, T. C. Hamie & Sons, general store and post office, 35 x 100 with addition 24 x 30, $5,000.

Montreal, Que.

Factory of Consumers Cordage Company, 283 St. Patrick street, burned, loss $150,000. Will rebuild. New machinery required.

Store of W. Stradlinger, 1428 Notre Dame W. burned. Will rebuild.

Port Arthur, Ont.

Office building, $15,000, of Chronicle Printing Co., Ltd., burned. Damage done to machinery and stock, loss $15,000.

Perdue, Sask.

The Maple Leaf Milling Company's elevator has been destroyed by fire.

Proctor, B.C.

The Wattsburg Lumber Company's mill and machinery completely destroyed by fire.

Winnipeg, Man.

Emmanuel Baptist Church, Bannatyne and Emily streets, burned, loss $12,000. Pastor Rev. S. J. Arthur. Will probably rebuild.

Miscellaneous

Ottawa, Ont.

General Supplies. Dominion Government, Dept. of Naval Service. Deputy Minister, G. J. Desbarats. Tenders received by Minister until Dec. 3rd for the following: brass and copper sheets, bars and tubes, zinc and lead sheets, steel plates, shneets, angles and bars, steel wire rope, solder, spelter and tin, babbit metal, copper and steel nails, steel files. Delivery to be made at H. M. C. Dockyards at Halifax, N.S. and Esquimalt, B.C. Forms of tender may be had by application to the Dept. or the Naval Store Office at either Dockyard.

Winnipeg, Man.

Milk depot, cost $8,000, Pritchard. Owner and general contractor, N. B. McIntosh, Pritchard ave. One storey, 40 x 40, frame construction, cement foundation.

New Companies

The Bobbie Burns Realty Company, Limited, has been incorporated with a capital of $40,000, to carry on business as a general land and building company, with head office at Toronto. The provisional directors are S. B. Burns, M. H. Williams and E. C. Bastedo, real estate brokers, all of Toronto, Ont.

Ontario and Eastern Realties Limited have been incorporated with a capital of $10,000, to erect buildings and deal in all kinds of building, materials, with head office at Brockville. The provisional directors are W. S. Buell, A. G. Parish, barristers, of Brockville.

Argentine and Canadian Investments, Limited, incorporated, with a capital of $100,000, to carry on business as a land and building company, with head office at Toronto. The provisional directors are N. D. Maclean, barrister, M. E. Robins, real estate agent, and H. R. Moses, law student, all of Toronto.

The Humber Cement Brick Company, Limited, has been incorporated with a capital of $40,000 to manufacture and deal in bricks, cement bricks and builders' supplies, with head office at Toronto. The provisional directors are J. A. McAndrew, G. H. Kilmer and W. H. Irving, barristers, all of Toronto.

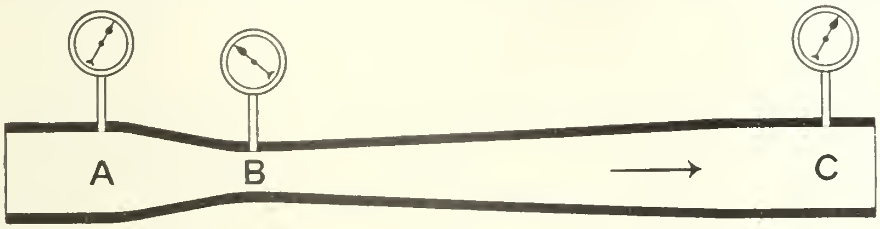
Romac (Ontario) Limited, has been incorporated with a capital of $300,000, to manufacture rocmac and other paving material, with head office at Toronto. The provisional directors are W. H. Walter, bookkeeper, Harry Riley, law clerk, J. F. MacGregor, bookkeeper, all of Toronto.

The Beechwood Land Company, Ltd., has been incorporated with a capital of $40,000, to carry on business as a land and building company, with head office at Hamilton. The provisional directors are W. W. Currier, Hugh McReynolds, estate agents, and M. D. Judah, salesman, all of Hamilton.

Sterling Investments, Limited, incorporated, with a capital of $50,000, to carry on business as a land and building company, with head office at Toronto. The provisional directors are F. I. Green, real estate agent, A. C. MacNaughton, barrister, and A. L. Shaver, law student, all of Toronto.

TO TEST CENTRIFUGAL PUMPS

THE "VENTURI" WATER METER BUILT BY **THE BUILDER'S IRON FOUNDRY** IS INDISPENSABLE FOR ACCURATE MEASUREMENTS.



"VENTURI" METER TUBE

Discharge Line from Centrifugal Pumps

It is now becoming customary for engineers to specify one or more Venturi Meters in connection with centrifugal pump contracts, and to state in the specifications that the pump will be rated by the Meter. It is a source of satisfaction to the purchaser and the pump manufacturer to *prove* that the guarantees have been filled.

The performance of this type of pump frequently deteriorates after several months of service; this may be due to the wearing or pitting of the propeller vanes, foreign objects in the interior, or other causes. The Venturi Meter when used with a centrifugal pump has frequently revealed an unsuspected falling off in pump efficiency, and investigation has disclosed the necessity of thoroughly overhauling the pump. Such loss otherwise might have gone on for months without discovery. The Meter also enables the superintending engineer to determine just what combinations of speed and head pumped against are the most efficient under actual conditions of service. For other applications

See Bulletin 75

THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO., LIMITED

Works: Seigneurs & William Sts., MONTREAL **Sales Offices:** MONTREAL, TORONTO, COBALT, WINNIPEG, CALGARY, VANCOUVER

Manufacturers of Boilers, Castings, Condensers, Elevators, Engines, Filters, Forgings, Hydraulic Machinery, Pumps, centrifugal and reciprocating, Steam Turbines, Tanks, Water Wheels, Water Works Plants

WATER PURIFICATION

This problem has been solved in Britain by the Bell Systems of Pressure Filtration and Softening.

The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

BELL FILTRATION CO. OF CANADA, LIMITED
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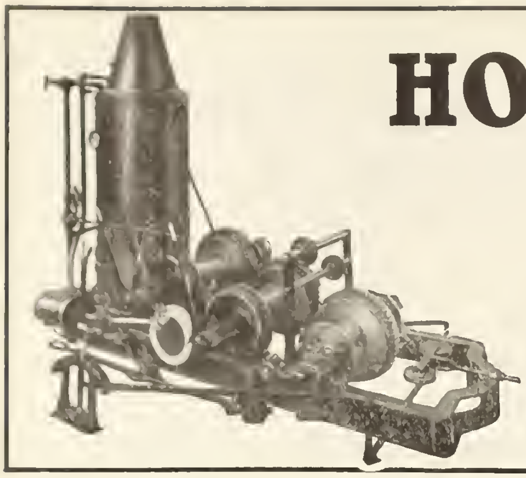

HOISTING ENGINES

Some of the strongest friends of the M. & H. Hoists are to be found among the men who have owned and used them. For instance the following written by one of the Lumber Kings of Canada—a man who telegraphed us an unsolicited order for another hoist not long ago.

"Answering your enquiry, I am pleased to state that the hoists with which you supplied me some years ago have given good satisfaction and have been in pretty constant use ever since.

No other Hoist in Canada has so many practical improvements as the M. & H. Hoist for 1912. Let us tell you about them.

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Sales Agents: MUSSENS Limited, Montreal **Belleville, Ontario**

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Prompt Shipments Guaranteed.

Rhodes, Curry Co., Limited

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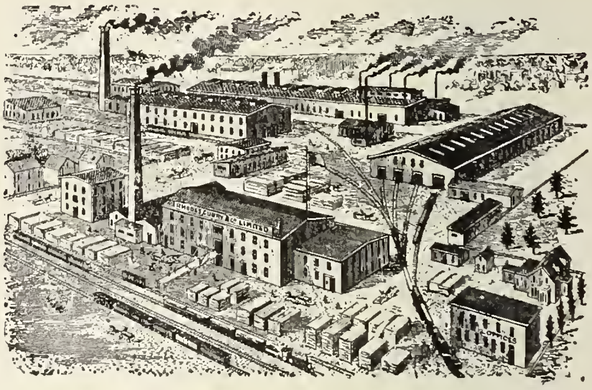

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SCHOOL DESKS A SPECIALTY

We manufacture all kinds of building materials, including cast iron columns, cresting, sash weights, etc.

In addition to our large stock of native lumber, we are now carrying about one million feet of foreign lumber, including oak, walnut, ebony, whitewood, basswood, red cedar, Douglas fir, mahogany, &c.

Rhodes, Curry Co., Ltd. **Amherst, N. S.**

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FOR SALE FOR IMMEDIATE DELIVERY

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1—Little Giant Steam Shovel 26 Ton Traction one yard bucket
1—No. 1 Full Circle Vulcan Traction Steam Shovel
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1—Buckeye Trench Machine, cuts trench 27"x 10'
1—Buckeye Trench Machine, cuts trench 24" & 30" x 12'
1—Parson Trench Machine, cuts trench 28" to 60" x 20'
1—Municipal Trench Machine, cuts trench 24" to 72"x24'
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2—1½ yd. Page Drag Line Buckets
1—1 yd. Obenberger Drag Line Bucket
5—1½ yd. Clam Shell Buckets (Brown Hoisting Mach. Co.)
1—J. I. Case 10 ton Steam Road Roller
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1—36 Gauge 16 ton 9x16-4 wheel Saddle Tank Locomotive
1—45 ton Vulcan Track Shovel

CREAM CITY EQUIPMENT COMPANY

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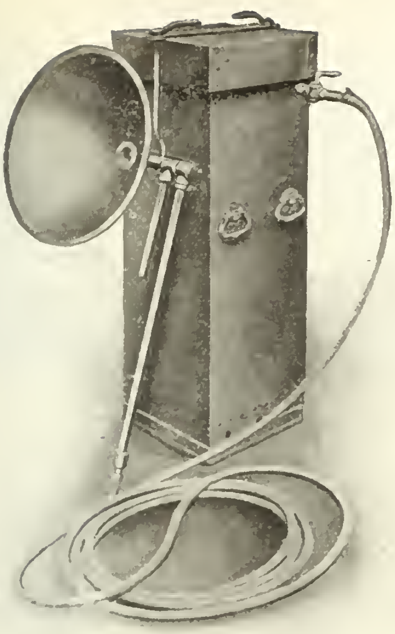

5,000 to 12,000 Candle Power at 5 cents Per Hour

How is that for cost? Can you beat it with any other light? The Milburn Acetylene Light is cheaper than oil or arc lights and just as simple as gas in your own house.

The Milburn Light shown above has a 15-inch aluminum, non tarnishing reflector, with absolutely storm-proof burner on swing joint, and 25 feet of armored hose and connections. It has a water-tight cover and is made to withstand hard usage, the vibration and movement of wrecking cars, cranes, steam shovels, dredges, etc. The light follows the crane or shovel and throws its rays directly upon the work.

THE MILBURN LIGHT

is made by water and carbide, burns more than half air, and requires no attention during use. Most of the fittings are of standard sizes, obtainable anywhere. It lights instantly and is absolutely safe. Tens of thousands of these lights are in constant use by all classes of users and not a single accident has ever been reported. They are now being used on all kinds of construction work in all parts of the world. Up-to-date contractors swear by them. You had better get acquainted with the Milburn Light.

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"HALITUS" Ventilators

Highly Efficient

Inexpensive

Sizes 6 to 96 inch Diameter Neck Meas't.

The Flanged **"Halitus"** just as shipped, all ready to nail on the roof.

Catalogue and price list on request.

The Metallic Roofing Co., Ltd.

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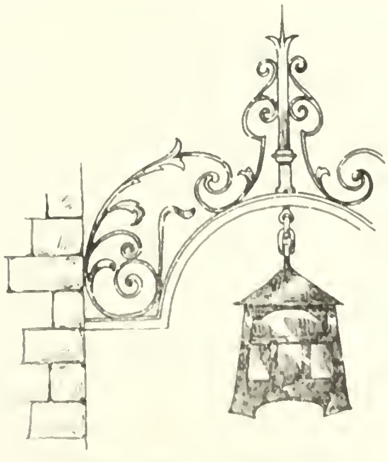
Toronto, Ont. Winnipeg, Man.
(40)

Ornamental Wrought Iron Work



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Architects designs executed with fidelity and spirit

Dennis Wire & Iron Works Co.

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They have been the standard for more than twenty-five years. Their colors are soft, rich and beautiful, and guaranteed fast. They are made of Creosote, which thoroughly preserves the wood, and they contain no kerosene or other cheapener. Accept no substitution of unknown stains, because you are sure of Cabot's.

Special Shades on Request

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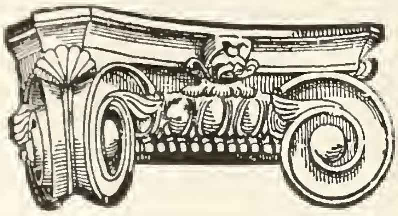

Centre Pieces, Brackets, Veranda Capitals and Freizes. Claphams Grey Wainscoat Cement Finish for Bathrooms, Kitchens, Lavatories, etc.

JOHN CLAPHAM & SON

69 Hughson Street N. - - HAMILTON

Bulletin No. 200

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For General Contracting Purposes

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They combine strength of construction with simplicity, compactness and ease of operation. Absolutely "fool proof"—they can be left in charge of an unskilled laborer and will work the full shift without a stop.

Our Pump Bulletin is yours for the asking — a card will do

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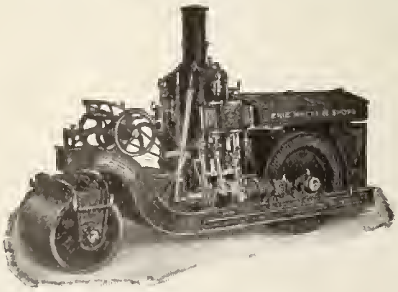

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SERVICE

White Gypsum - A Modern Plant - Experience

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"Lead Wool"

is the best

jointing material

for spigot and faucet pipes for Gas and Water Mains.

Joints can be made in water without difficulty.

"Lead Wool"

joints are caulked cold, no melting whatever required.

One ton of "Lead Wool" will make as many joints as two tons of pig lead.

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Contractors and Plasterers
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For Railroad and Municipal Contractors

Are known from coast to coast for their strong construction and durability, and are in use on the largest construction works in the country.

Only the very best materials enter into their manufacture and our trade mark stamped on every shovel is a positive guarantee that goods are as represented.

Our Round
Point Socket
Strap Plain
Black Shovel

The Shovel
That Stands
The Test

We will send to any contractor, free, express prepaid, upon request, a sample shovel, which will speak for itself. Send also for our illustrated catalogue, showing our full line of Shovels' Spades, Scoops, Draining Tools, etc.

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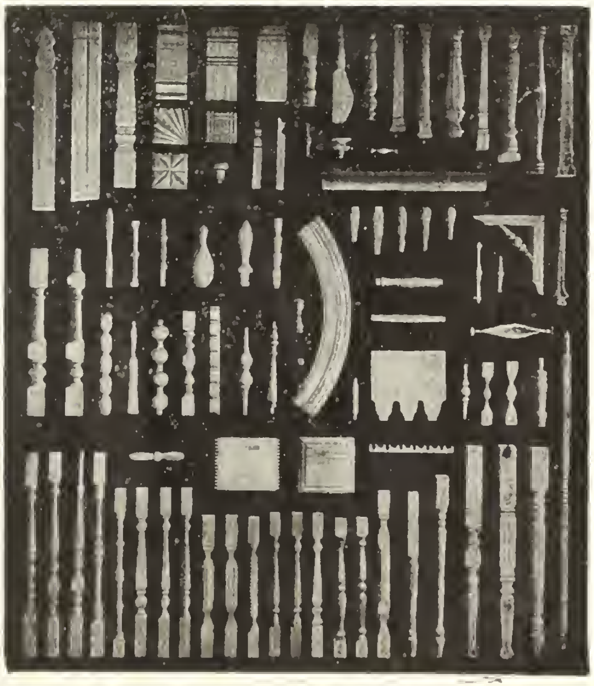

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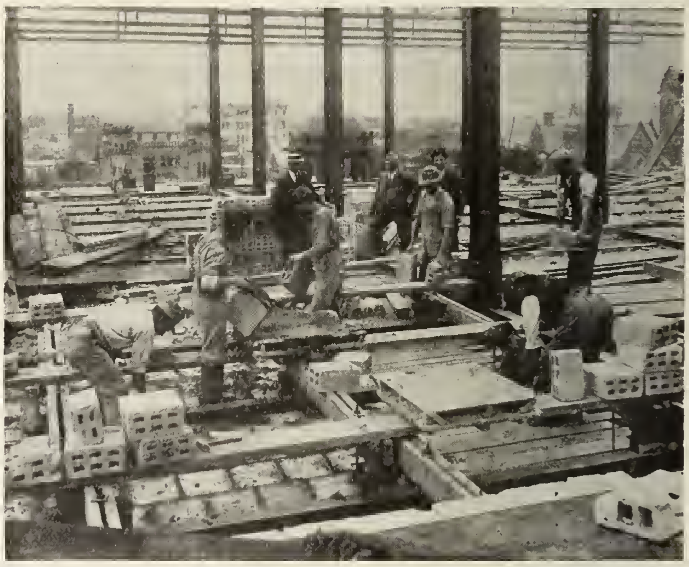

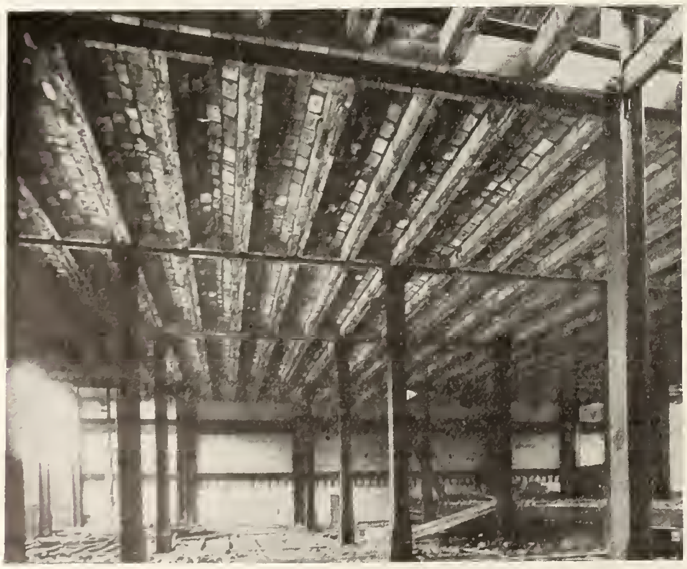

This illustration shows the finished floor and ceiling underneath.

We make a specialty of this particular kind of hollow tile work.

Our workmen are experienced and our equipment up-to-date.

We guarantee first-class workmanship at the lowest cost.

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Complete Electric Hoisting Machines for Mines, Steel Plants, etc.

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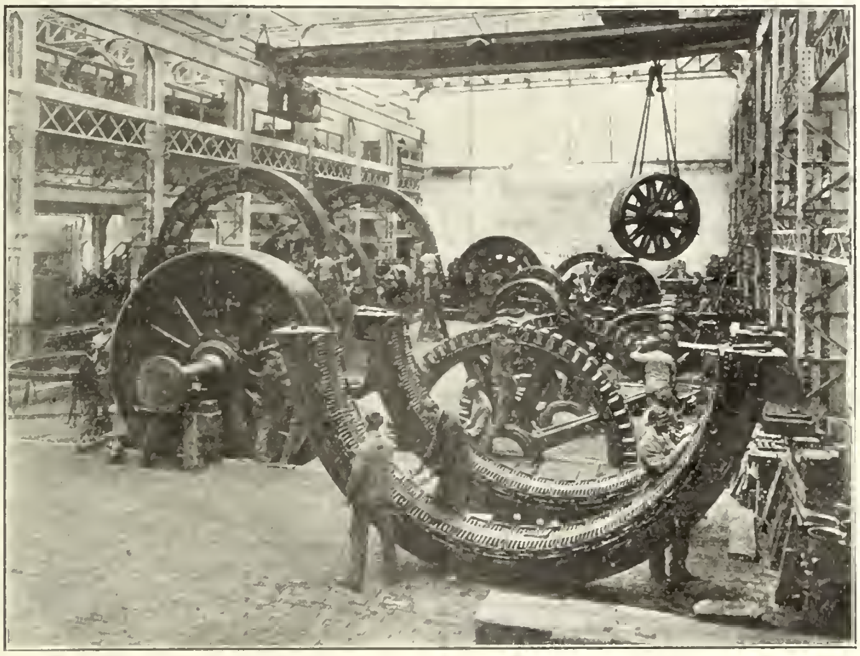

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for Water Works, Power, Irrigation, etc.**

Withstands 250 lb. working pressure.

Not affected by Frost, Corrosion, Electricity or Acid. Water Works Systems installed. Prompt attention to inquiries.

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Steel Curb, Curb and Gutter, Crosswalk, Sidewalk and Driveway Forms for Concrete street work.

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with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13. No. 2—27 x 16 x 13. No. 3—33 x 22 x 18.

Send for our illustrated booklet, it shows and describes our full line of Coal Chutes

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Montreal Representative: E. F. Dartnell, No. 8 Beaver Hall Square
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The Luxfer System Saves Its Cost

After installation Luxfer costs nothing. It saves its cost in artificial lighting bills alone. It makes merchandising more satisfactory to both storekeeper and customer. After all, merchants know that a big business cannot be done in dark premises. The architect or builder who specifies Luxfer wins the respect and confidence of his clients, because it is invariably satisfactory.

Specify more than just Prisms, make it "LUXFER Prisms."

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The Mushroom System

is the Modern Method of Reinforced Concrete Construction for Bridges and Buildings

ELIMINATION OF BEAMS means money saved for owner and builder.
THE COST OF CENTERING is greatly reduced due to saving in Beam Framing.
STOREY HEIGHTS are reduced one or two feet per storey, saving in Brick Walls.
DISTRIBUTION OF THE METAL in Mushroom System Slabs gives the greatest efficiency.

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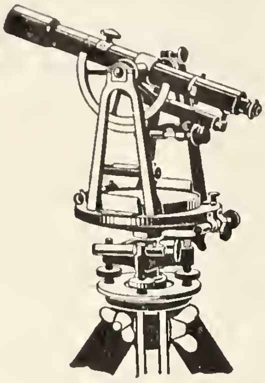

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The "Buff" is used almost exclusively on the largest works in the United States and Canada.

Send for Catalog No. 12

Buff & Buff Mfg. Co.

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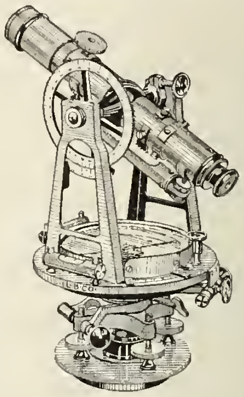
(Agents in all Canadian Cities)

Our Guarantee is Your Protection

Beckmann Instruments

Are All Guaranteed

Price Low



Quality High

Our reputation is backed by 38 years of experience.
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Our Instruments are for Sale by the leading dealers everywhere.

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Established 1874
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Engineers, Boilermakers, Machinists, Founders

Manufacturers of

Emerick Ball Pulverizers, Emerick's Separators, Vibrating Screens, Tube Mill Feeders, Cement Manufacturing Machinery, Rotary Kilns, Ball and Tube Mills, Engines and Boilers, Dump Cars, Smoke Stacks and Tank Work, Grey Iron and Brass Castings, Heaters and Purifiers

Special attention given to Cement Mill Machinery Repairs, Cleaning and Welding Boiler Tubes

Steel Plate Work, STRUCTURAL STEEL and Municipal Bridge Work

We solicit an opportunity to tender on any work in the above lines

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AINSWORTH'S 1912 POCKET MANUAL

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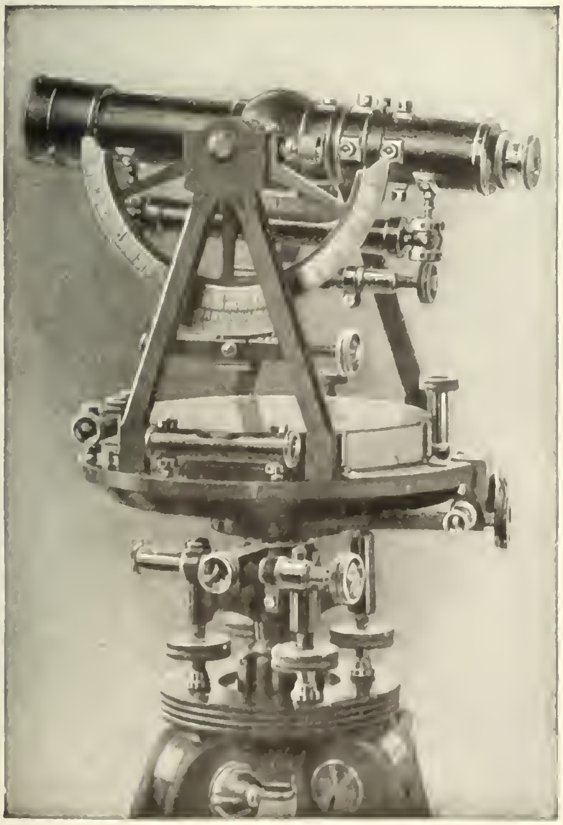

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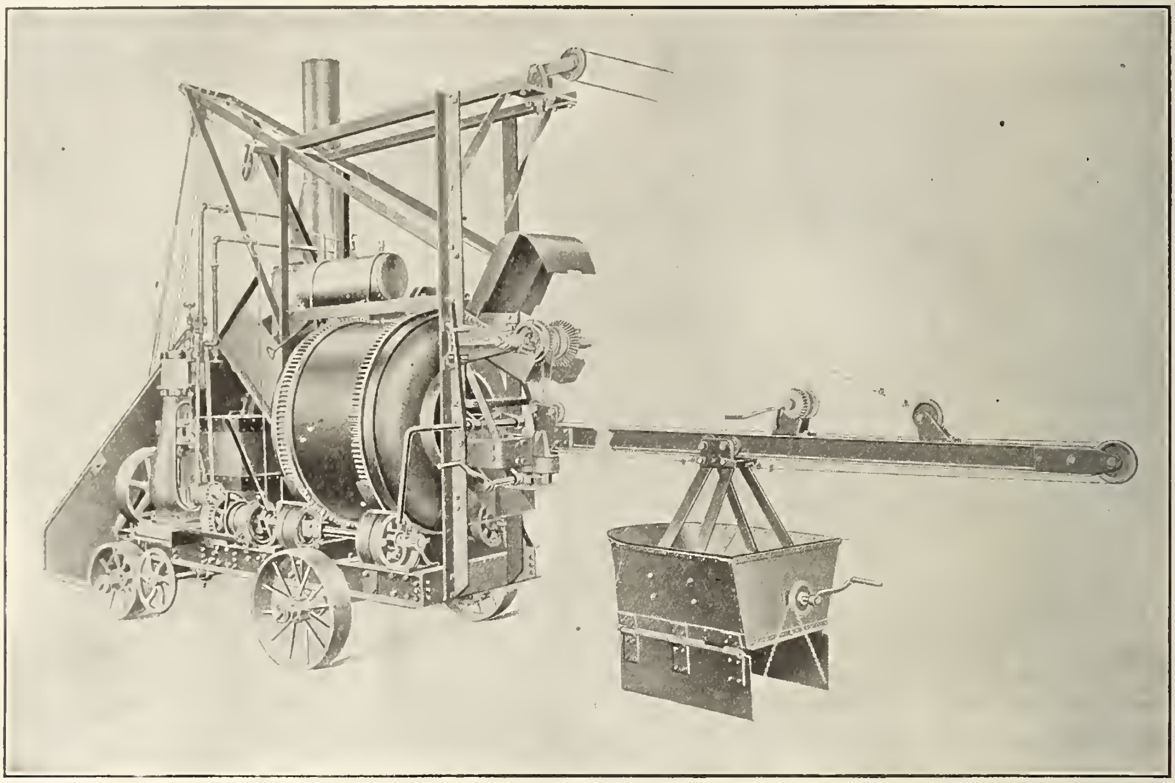

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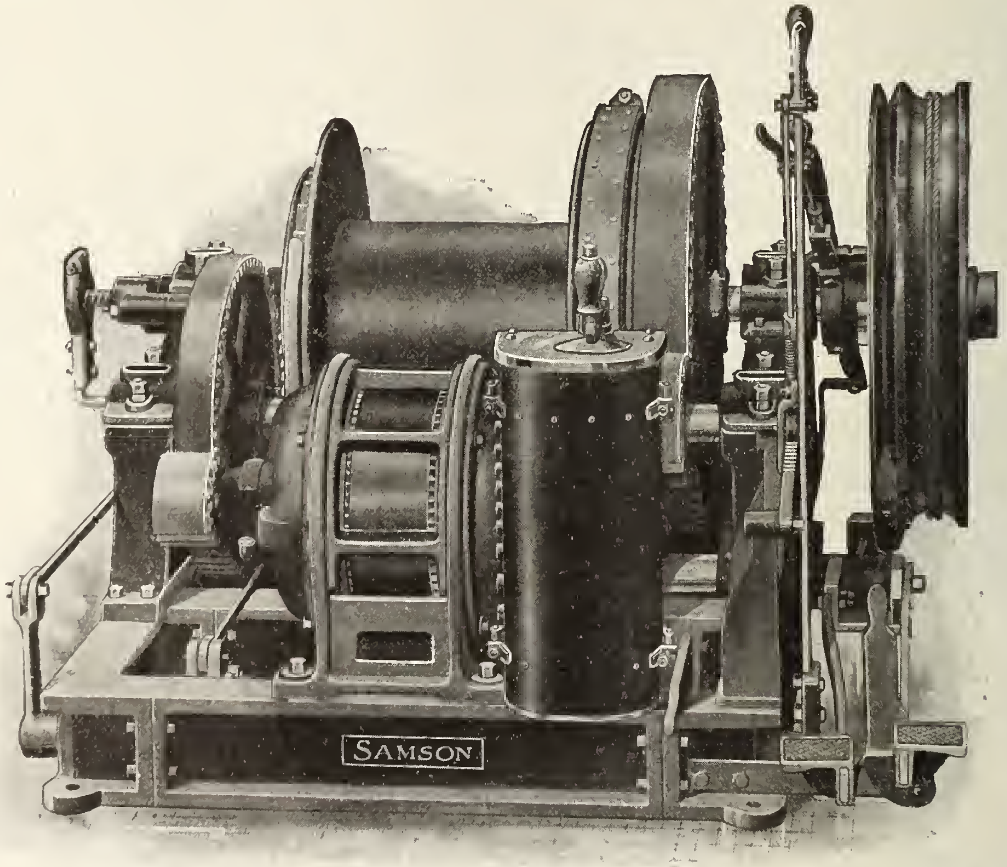

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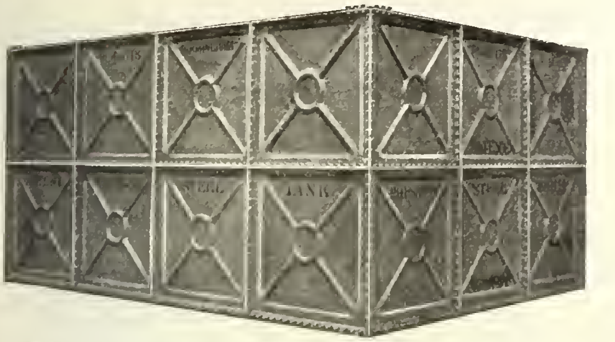

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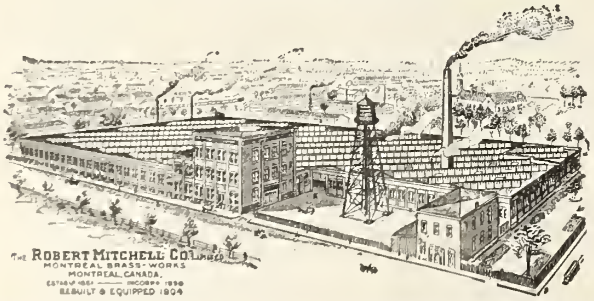

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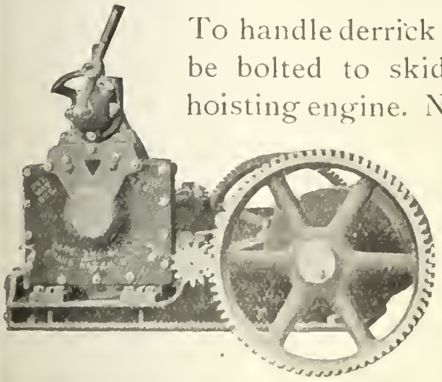

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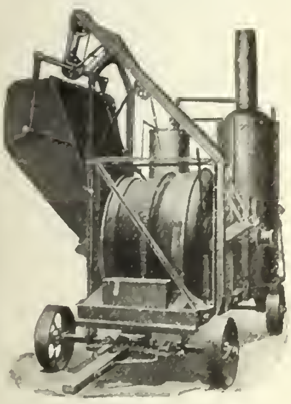

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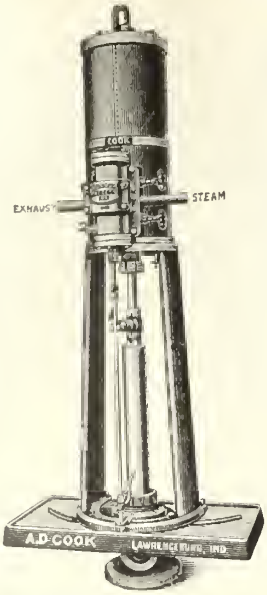

Water Supply from Deep Wells

is obtained at a minimum cost by use of our deep well pumps.

Write for Bulletin 26 explaining the use of Cook's Patent Brass Tube Well Strainer.

A. D. COOK
Lawrenceburg, Indiana, U. S. A.

Manufacturer of a Complete line of **DEEP WELL SUPPLIES** including Steam, Belt and Motor Driven **DEEP WELL PUMPS**, Wind-mill and Hand Pumps, Working Barrels and Valves, Pump Rods and Pump Rod Joints, Drill Rods and Drill Rod Joints, Drilling and Well Tools.

CATALOGUE MAILED UPON REQUEST.

WE SPECIALIZE IN INTERIOR FITTINGS

Our plant was designed specially for the manufacture of the finest fittings for BANKS, LIBRARIES, OFFICES, STORES AND PUBLIC BUILDINGS.

Architects and contractors requiring the very highest class of interior woodwork should send us their specifications. List of customers and references gladly furnished.

The
Oshawa Interior Fittings Company
OSHAWA, ONT.

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It is easy to obtain with our plants and apparatus

We design and contract for complete municipal filtration plants of any capacity.

- We supply and install apparatus for sterilizing water supplies by the application of calcium hypochlorite.

Literature, Sketches, Estimates and Recommendations Supplied on Request

American Water Softener Co.
1001 Chestnut St., PHILADELPHIA, Pa.

We have no affiliations or working agreements with any of our competitors.

Note tremendous metal weight on this floor. Entire building of Alsen's Cement reinforced concrete.

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

Practical Cost Data on

Herringbone Metal Lath

The ceiling of the Power House of the Toronto General Hospital measures one hundred and twenty yards net. One hundred and twenty-two yards of **Herringbone Lath** covered it completely, waste and lap included.

This is not a record; it is a typical case. The Herringbone selvage edge is the reason.

CLARENCE W. NOBLE
General Sales Agent
117 Home Life Building, Toronto
Metal Shingle and Siding Co., Manufacturers

TENTS

for Engineers and Contractors

We are manufacturers of a very complete line of tents for engineers' and contractors' use and can make shipment the same day as order is received.

We also make engineers' and surveyors' clothing, in fact we can fit you completely for camp and survey trips.

Send for our catalogue
It will interest you

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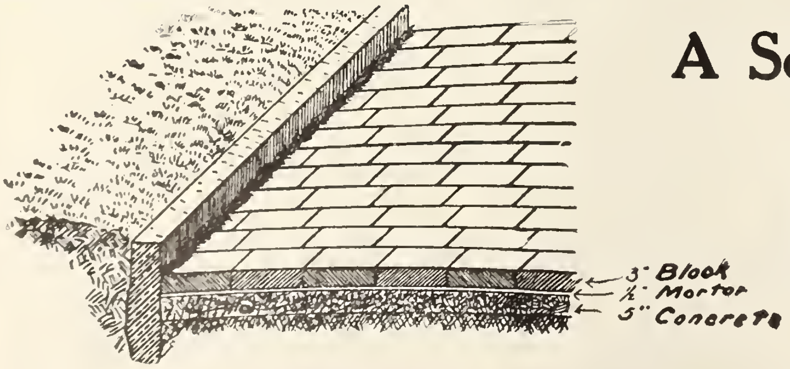
Woods Building - Ottawa, Ont.



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must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
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Steel Bridges, Steel Buildings
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Foundry and Machine Shop in connection.
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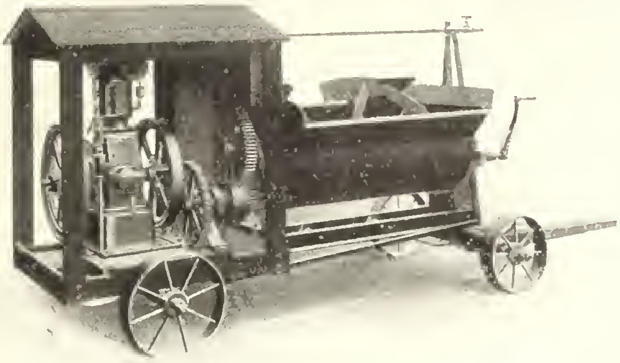

The Blystone Mounted Mixer with Power

You will do your concrete mixing quicker and cheaper with the Blystone Mixer. This is not what we alone say but what all users say. This mixer is adaptable to all kinds of work. We are willing to prove its advantages to you—give us the opportunity.

Simple, Durable and ALWAYS READY

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The Blystone Machinery Company
61 Railroad St., CAMBRIDGE SPRINGS, Pa., U.S.A.

Full line of Blystone Mixers carried in stock by
The A. R. WILLIAMS MACHINERY COMPANY, Limited
Contractors Department No. 1, TORONTO, CAN.
Sole Distributors for Canada

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This residence has a roof that is fire proo —it is different from the wooden or composition roofed home—heat and flying embers from a fire "next door" would be harmless.

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shingles are composed of asbestos fibers and hydraulic cement—no painting every two or three years and no repair expense—they make the most economical roofing you can specify.

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Shingles

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Concrete-Steel Dams, Bulkheads, Flumes, Transmission Lines, Power Houses and General Hydraulic Construction

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Swedish Charcoal
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Best Plow
Galvanized Siemens-Martin
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Write for catalogue. State kind of rope required or purpose to be used for.

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Limited
HAMILTON, ONT. MONTREAL, QUE.

Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per M
No. 1 dry pressed red brick	$18 00
No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	11 00
Wire cut bricks for foundation work	12 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

LUMBER (Building Material)

Hemlock Lumber—		
2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00
Pine—		
1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pine Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	
Pine trim for paint finish—		
4 in. casing per 100 ft.	2 00	
5 in. casing per 100 ft.	2 25	
8 in. pine base, per 100 ft.	3 25	
10 in. pine base, per 100 ft.	4 25	
4 in. pine window stool	2 75	
Shingles—		
XXX B. C. Clear Shingles, per M.	3 60	
N. B. Extras	3 50	
N. B. Clears	2 90	
No. 1 pine lath, per M.	4 75	
No. 2 pine lath	4 25	
No. 1 spruce lath	4 00	
Cedar Posts—Fence—		
5 in. at small end, each	25	
7 in. at small end, each	35	
Hemlock lath	3 25	

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 20 per cent. for Star and 25 per cent. for D.D.

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24.00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots —

MONTREAL

	Star	D.D
25	$3.25	$4.75
40	3.45	5.20
50	3.85	6.00
60	4.10	6.50
70	4.35	7.00
80	4.85	7.50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B Montreal

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 per cent.

High grade compression work, 55 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 and 10 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.50

Square head brass cocks, 60 per cent.

Lead Pipe

Lead pipe, $7.50 net; lead waste, $9.00 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$2.04	¼ inch	$2.86
⅜ "	2.04	⅜ "	2.86
½ "	2.72	½ "	3.57
¾ "	3.16	¾ "	4.31
1 "	4.54	1 "	6.19
1¼ "	6.19	1¼ "	8.44
1½ "	7.43	1½ "	10.13
2 "	9.90	2 "	13.50
2½ "	15.80	2½ "	21.56
3 "	20.75	3 "	28.31

Malleable fittings—Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 67½; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 and 10 per cent.

Plain steel bars, $2.15.

Square twisted bars, ¾ to 1¼, $2.25.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 65 per cent.

7 and 8-inch pipe, 50 per cent.

Sewer Pipes

4-in.	25c ft.	15-in.	1.35 ft.
6-in.	40c ft.	18-in.	1.90 ft.
9-in.	65c ft.	20-in.	2.25 ft.
12-in.	1.00 ft.	24-in.	3.25 ft.

all less 60 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.80.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.55.

Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜ inch, $1.45.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered. $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and heads, in the rough, delivered, 40 cents per foot.

Rubble stone in car lots, $1.30 per ton.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, 9.00 in car lots.

Lime, per cwt., delivered, not less than 1,500 lbs., 33 cents; white, 43 cents.

Plaster of Paris, Anchor Brand, $1.50.

Manilla Rope, best, per pound, 12½ cents

PAINT AND OILS
(Wholesale Prices at Toronto)

Pure White Lead, ground in oil, $9.00 per 100 lbs

Boiled Linseed Oil, in barrels, 72c per gallon.

Raw Linseed Oil, in barrels, 69c per gallon

Turpentine, in barrels, 62c per gallon.

Pure Red Lead, dry, $7 to $8 per 100 lbs.

Putty, pure linseed oil, in bulk, bbls., 3½c

Putty, pure linseed oil, in 25 lb. tins, 4c

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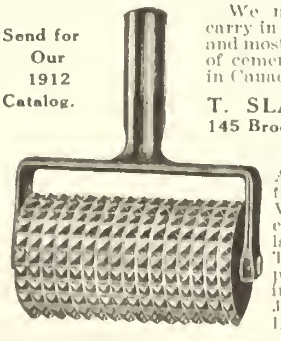

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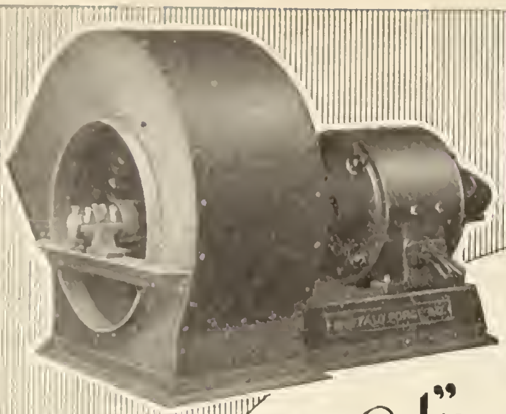

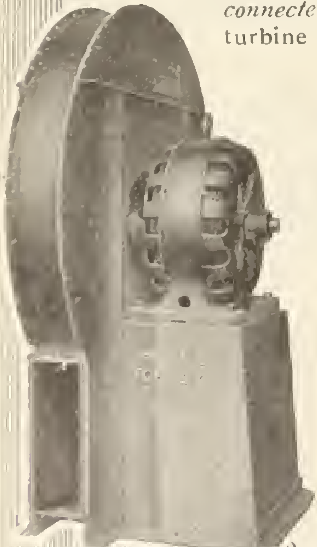

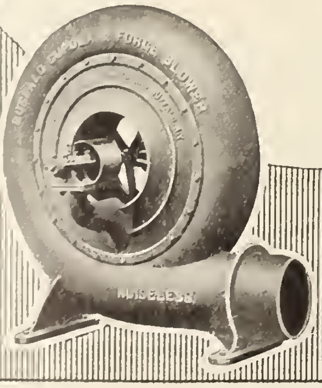

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Ask our engineers to recommend the fan best suited to your requirements. Our designs include the new high-efficiency "*Conoidal*" multiblade fan, used extensively for heating systems, mine and tunnel ventilation, and the motor-driven *Steel Plate Pressure Blower*, giving pressures up to 24 oz. Both of these designs show higher efficiency than obtained with any similar types. We specialize in *direct-connected* units (motor, engine or turbine driven) for every service. These are distinguished by absence of belt troubles and the very lowest power consumption. Whatever your problem write us.

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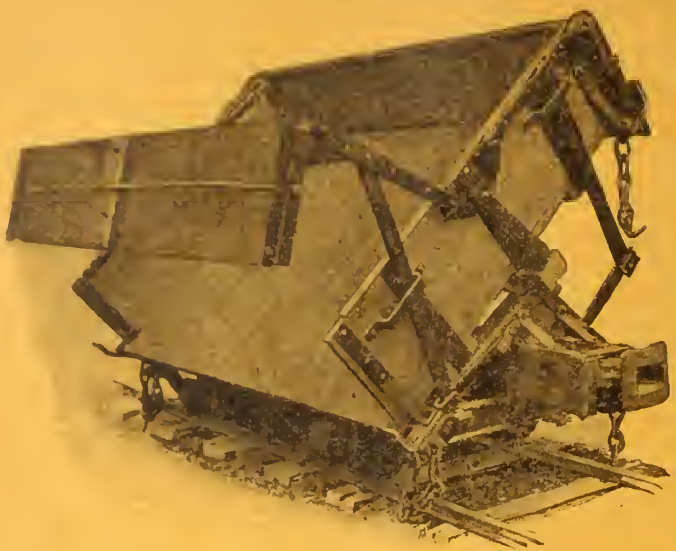

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Our Dump Cars will give you entire satisfaction. We can supply cars in all capacities for any practical guage. Wheels are all properly chilled and the construction and material used are the best.
Our Cars are declared by steam shovel and car men to be superior to all others, both in construction and operation.

Let us have your enquiry, we would be pleased to submit full particulars and prices at any time.

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For Contractors and Quarry Service

Supplied in any size for any practical guage track.

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For Railroads — Contractors — Brickyards, Etc.

We supply Steam Shovels in all sizes. Can furnish both Standard and Revolving types. Write us stating your special requirements and we will be pleased to submit proposition.

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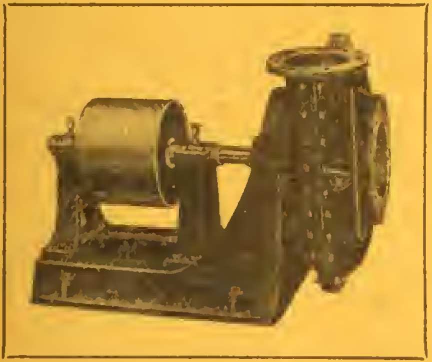
Toronto's Engineering and Constructional Development

Contract Record and Engineering Review

ESTABLISHED 1886

Vol. 26 Toronto, November 27, 1912 No. 48

Steam and Power Pumps,
Condensers, Travelling Cranes,



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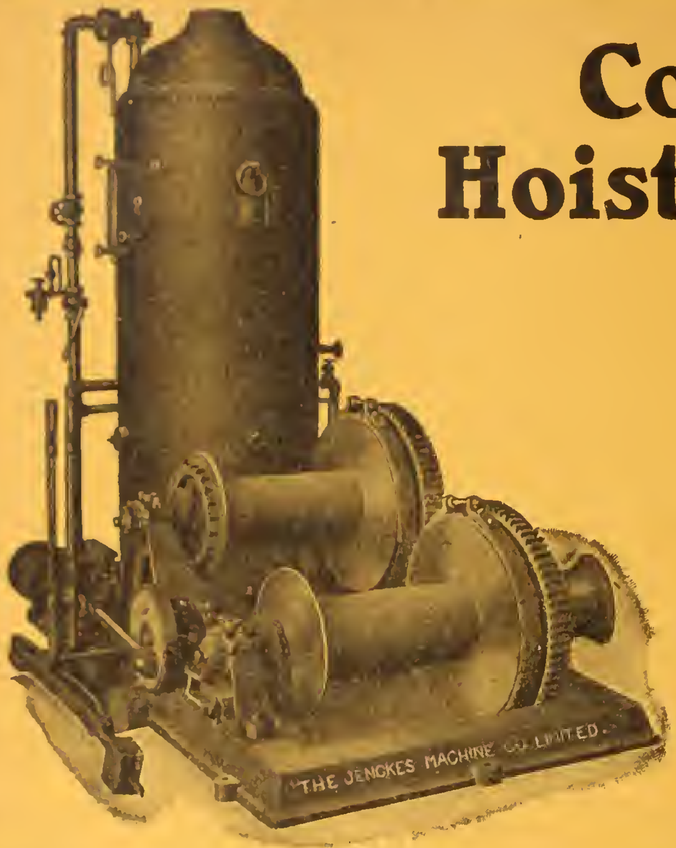

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¶ Full particulars and prices to interested parties on request.

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This is the Fastest Sand Handling Plant on "The Lakes"

It consists of an 'American' Derrick, "American" Engines, and a 1½ yd. capacity Clam Shell Bucket.

It's the Ideal Combination for the man who wants the Best Sand Handling Plant that money can buy.

Tell us what you'd like to know about handling your sand successfully and economically.

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What would be your answer?

IF a layman asked you — an engineer or a contractor — what you thought of concrete roads, what would you tell him?

You're likely to be asked — if someone hasn't already put the query to you. "Good Roads" is a subject of vital interest to Canada and Canadians just now?

You're used to questions. People have a habit of asking men in your business about everything from aeroplanes to filtration plants.

You can answer most of them off-hand; but have you taken time yet to thoroughly post yourself on this big question of the day—"Good Roads."

We've saved you most of the trouble of doing so, by collecting and "boiling down" a great amount of information on highway construction and especially on concrete highway construction. This information is complete and definite. It is yours'—free for the asking.

A LETTER requesting our "Good Roads" literature will put you in possession of facts that will enable you to answer any questions on the subject of Good Roads.

Address Publicity Manager

Canada Cement Company, Limited
Herald Building, MONTREAL

Sales Offices:
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CONCRETE highways are not experiments. Their wonderful possibilities are proven by years of experience.

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will lift as much as THREE men can lift with a Differential Block and do it easier.

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lift quick, work easy, efficiency eighty per cent. Hold the load stationary at any point of the lift. The heaviest load may be lowered by a slight pull on the hand chain, at an even, steady motion.

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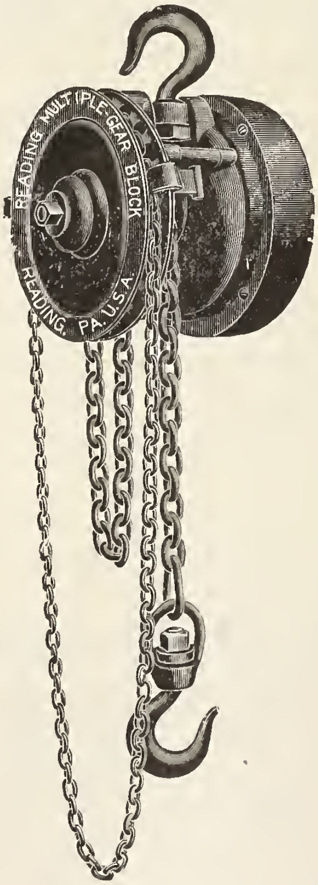

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Forged from solid steel throughout.
No Inserted Points

Has five times the life of an ordinary pick.

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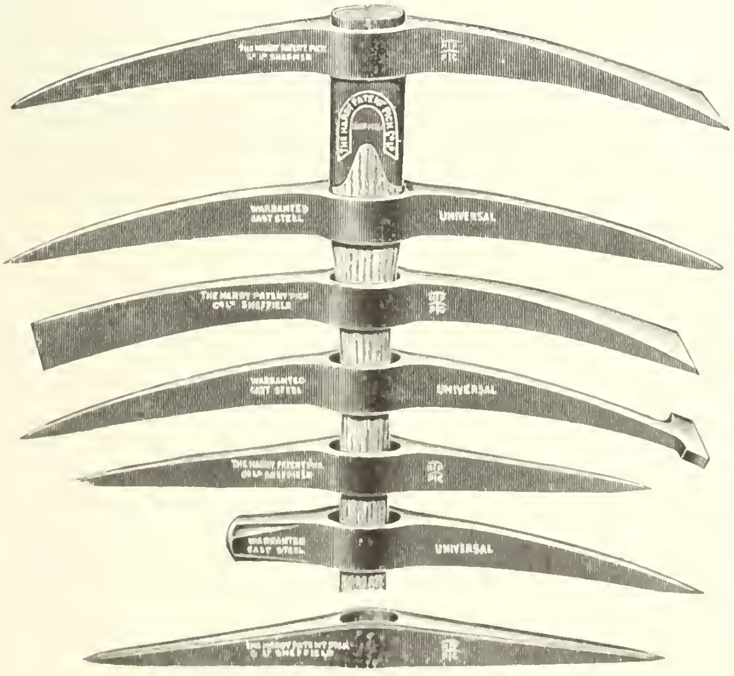
Cost more at the start but are a great deal cheaper in the end.



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Escher Wyss & Co.
Canada Foundry Co.

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Gartshore-Thomson Pipe Co.
Kerr Engine Co.

(Continued on page 12)

Don Valley Products

New Residence for Lieutenant Governor of Ontario, Toronto. Provincial Architect Heakes, Architect. Don Valley Brick and Porous Terra Cotta used throughout.

Don Valley Bricks

are used in the construction of the most important public buildings erected by the Provincial Government. They are specified by the leading architects for every building of importance. The latest example of the public recognition of their superiority is found in their use for the new Toronto Residence of the Lieutenant Governor of Ontario. Don Valley Bricks possess a beauty of color and an even texture and form which add that touch of distinction to a building that characterises it as fulfilling the essentials of decorative dignity.

Don Valley Hollow Tile Fireproofing is absolutely dependable for that structural strength necessary to resist the action of age or any other deteriorating influence. For many years its success as a staple and fireproof building material has been established in hundreds of practical tests in buildings throughout the country.

"SPECIFY DON VALLEY PRODUCTS"

THE DON VALLEY BRICK WORKS

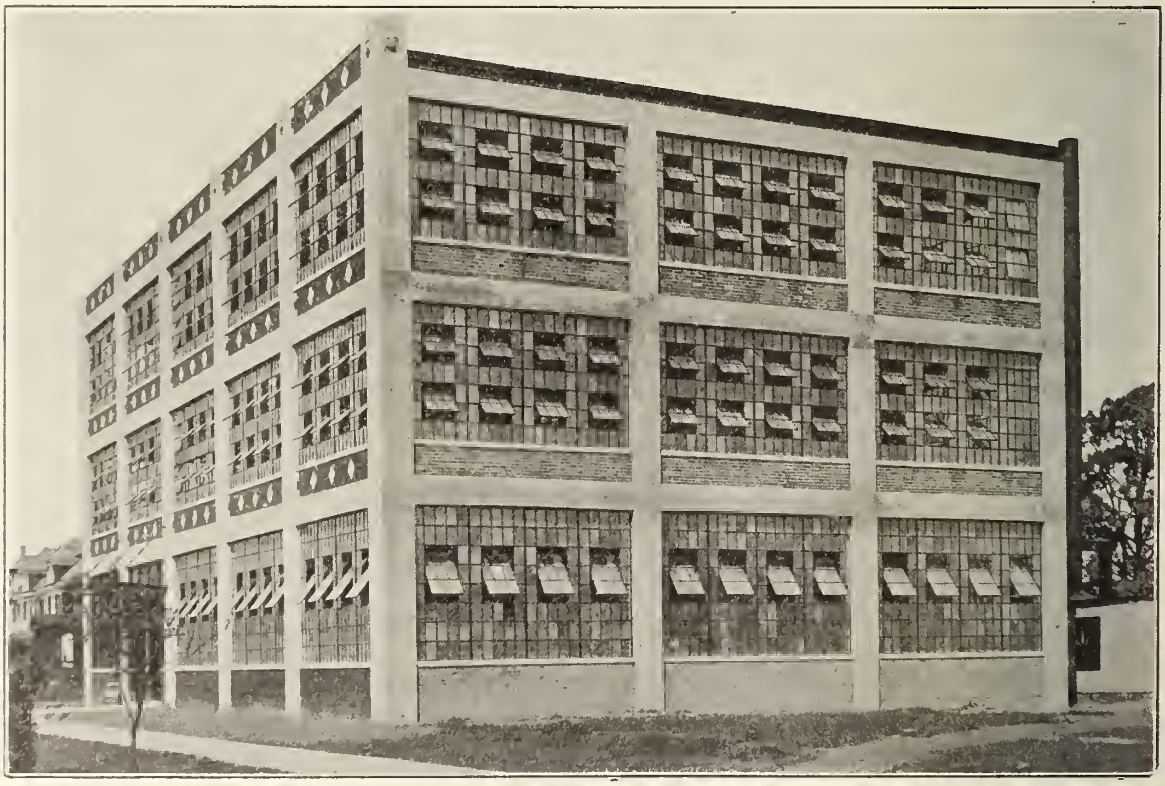
Head Office: 36 Toronto St., TORONTO
Montreal Agent: **David McGill, 83 Bleury Street**

LIGHT + VENTILATION = PROFITS

FENESTRA SOLID STEEL WINDOWS will provide your factory with an abundance of pure air; and light practically as good as that "out doors." Your employees will be able to do more and better work.

FENESTRA STEEL SASH not only increases production, but also reduces costs. Window upkeep expenses and artificial lighting bills are reduced almost to the vanishing point.

FENESTRA SASH is inexpensive compared with wooden sash, which is short lived and inflammable. It affords the minimum obstruction to light. It is attractive in appearance, strong and durable. Made to meet all conditions and sizes of window openings.



One of many buildings in Canada equipped throughout with "FENESTRA."

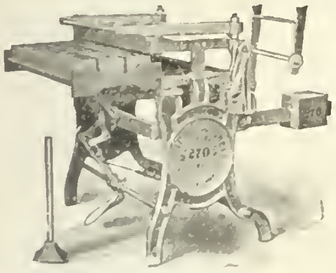
WRITE TO-DAY FOR CATALOG describing fully the merits of steel sash for all types of industrial buildings, large or small. FENESTRA has no equal for windows for foundries, power houses, factories, public buildings, machine shops, draughting rooms, railroad shops or any other buildings where the maximum light and ventilation are desired.

STEEL AND RADIATION, LIMITED

TORONTO, CANADA

CONCRETE MACHINERY

For all classes of work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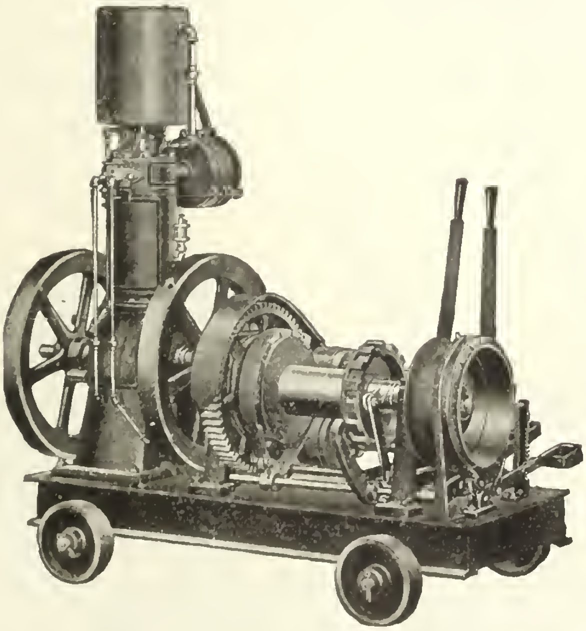
Lawn Vases

We are the only large manufacturers in Canada who specialize.

That is why we are able to supply the contractor with his every requirement in Machinery for the working of Concrete. Nothing counts like THE PRODUCTION ON A LARGE SCALE.

CONTRACTOR
TELL US YOUR
REQUIREMENTS

ASK FOR 1912
CATALOGUE

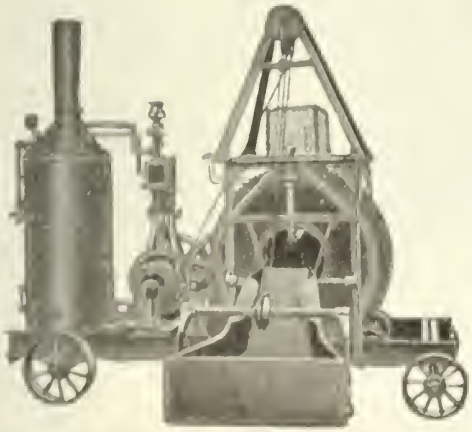

Builder's Double Acting Hoist

THE LONDON MACHINES are doing ALL WE CLAIM for them.

While we are BUILDING MACHINES we are BUILDING our REPUTATION.

THE ENORMOUS SALE of OUR MACHINES is sufficient proof to us that it pays to build machines of the VERY BEST TYPE.

The CHEAP article we do not make.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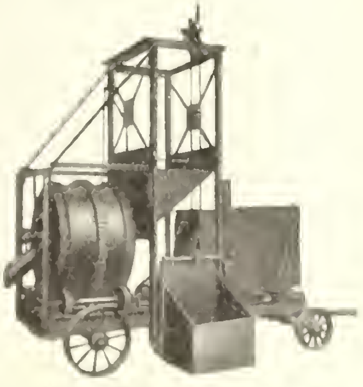
We manufacture a full line of CONCRETE MACHINERY and Cement WORKING TOOLS, also CONTRACTORS' MACHINERY and EQUIPMENT.


Paving Machine with Side Loader

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

AGENTS:
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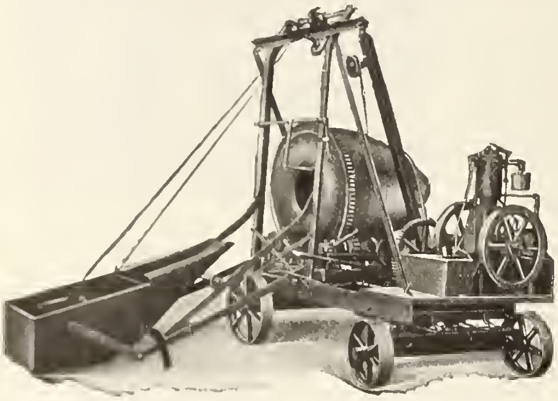
BRANCHES:
Toronto Office, 60 Richmond St. W. Winnipeg Office, 445 Main St. Calgary Office, 622 9th Avenue West

We are the Largest Manufacturers of Concrete Machinery in Canada

For Any Rush Job

You Are Forced to Admit



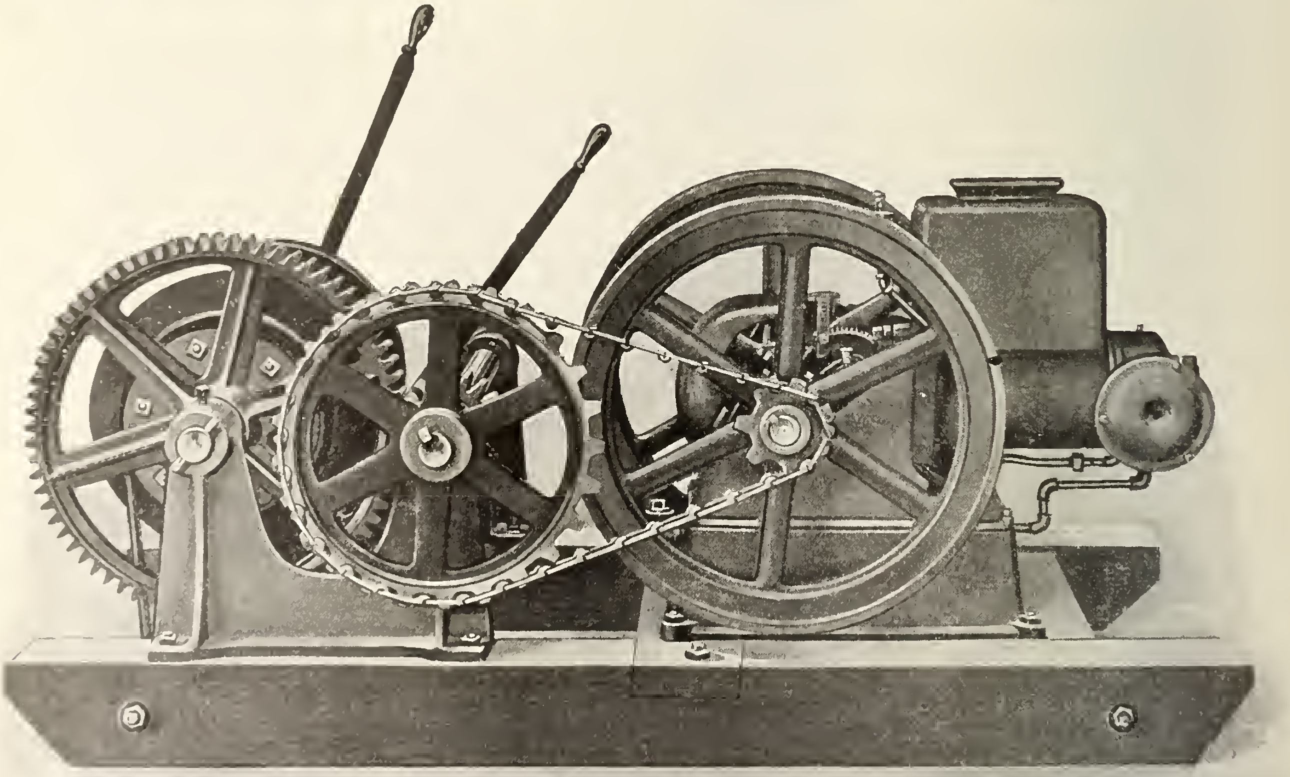
Wettlaufer No. 1 Heartshape Mixer

that

The Wettlaufer Improved Heartshape Mixer

will stand up to the work and see the job through with a certainty of good results that you can absolutely rely on. It will make yours a more profitable job by doing quick and perfect work with no stops for repairs.

Automatic operation—low running cost
Economical working throughout



Wettlaufer Single Drum Hoist No. 1

The most useful and complete hoist for all building and contracting purposes. Its compactness size and general handiness give it great advantages over the ordinary large cumbersome hoist and enable it to be easily moved around from one part of the job to another. Its capacity for work and general utility are unlimited.

Let us send you particulars of our Hoists and Mixers—or come and see them. Continuous Demonstrations at

WETTLAUFER BROTHERS

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Steelcrete
CONSOLIDATED

WHY

Steelcrete
CONSOLIDATED

Steelcrete
TRADE MARK
CONSOLIDATED

Reinforcement is Superior to all Others

(12 REASONS)

Theoretical Considerations

(1) **It possesses a high elastic limit—not less than 55,000 lbs. per sq. in.** This is not attained at the sacrifice of quality or uniformity "Steelcrete" is not a brittle and inferior steel but a tough, cold-drawn product with no equal in the market for uniformity of strength

(2) **It provides against concentrated loads.** Its diamond-shaped structure enables it to distribute the effect of a sudden local load over a great many strands.

(3) **Attains a perfect bond in the concrete.** This is due to its mesh shape which does not permit any slipping and there is no possibility of it

(4) **Perfect distribution of Steel.** Every foot of width possesses the theoretical amount of steel. The accuracy here attained is impossible in loose rod reinforcement

(5) **Longitudinal reinforcement.** "Steelcrete" mesh possesses strength in the longitudinal direction of the pipe equal to one third the strength in the circumferential direction.

(6) **Temperature stresses are guarded against.** The form of the mesh provides a positive reinforcement against these uncertain but definite stresses.

Practical Considerations

(7) **"Steelcrete" mesh is essentially a fool-proof reinforcement.** With the use of this material the man with the brains that designs the construction obtains an efficiency of 100 per cent. with ordinary every-day inspection and unskilled labour.

(8) **"Steelcrete" Mesh is a stiff reinforcement.** It holds its position in the forms in a way that no other mesh equals. It is far more important to have the reinforcement placed correctly in a vertical direction than in the horizontal.

(9) **It is cheaper to install.** Requires less labour than any other mesh or system of rods.

(10) **It is easy of inspection.** Only those who know "Steelcrete" know the trouble, delay and anxiety this saves to both contractor and engineer alike.

(11) **It can be placed quickly.** This means a saving in overhead charges. This feature has been overlooked by a great many engineers and architects in the past

(12) ALFRED ROGERS IS NOW CARRYING IN STOCK HALF MILLION SQUARE FEET OF "STEELCRETE" FOR IMMEDIATE DELIVERY.

ROGERS

Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

ROGERS

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery—Send us your orders for crushed stone.

ROGERS

French Caen Stone Cement

Monarque Brand and Cementa-line. Rich in appearance and of unlimited durability—as good as natural stone but cheaper. Full particulars on request.

Quotations made for all Work Prompt Deliveries and Complete Shipments given from Stock

Alfred Rogers Limited

28 King St. West **Toronto, Ontario.**

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  Canadian Mineral Rubber Co.
  Canadian Supply Company
  Metallic Roofing Co.
  Noble, Clarence W.
  Paterson Mfg. Co.

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ANOTHER "MEADOWS" JOB

Bank and Office Fittings

WITH our new factory and increased manufacturing facilities we are, better than ever, able to execute promptly, orders for all kinds of ornamental iron, bronze and brass fittings—bank fittings a specialty.

Our products include the famous Meadows Metal Locker for public buildings, offices, clubs or wherever lockers are required.

Write us for our illustrated literature.

Geo. B. Meadows

Toronto Wire, Iron and Brass Works Co., Limited - Toronto, Canada

Sawyer Belt will stand any weather

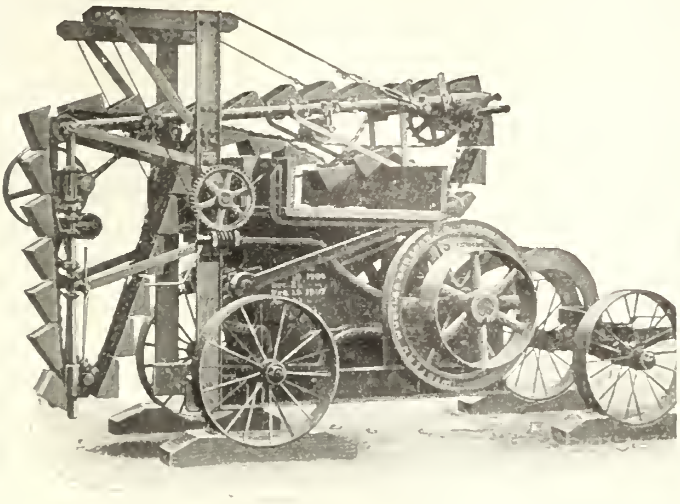
Exposure is the cause of many belting troubles. Neither leather or rubber belting, though expensive will stand both rain and shine.

Here is where **Sawyer Canvas Stitched Belt** shows its superiority. The compound in which it is immersed renders it pliable under all conditions.

It costs less—It wears more.

Try it in rain or shine

Sawyer Belting Co.
Cleveland, Ohio



Steel Castings and No Lost Motion

forged steel yoke, cross bars on yoke remove all strains from main frame, moving jaw given a compound oscillating and reciprocating motion so that crushing is **continuous**, are features of the

Aurora Steel Rock Crusher

Its compact form combines great strength with light weight, making it very portable, and **specially adapted for contractors' use.** Strongest and most durable crusher on the market combining maximum product with minimum power. Adjustable to various sized stone. *Get our Special Crusher Catalog*

WESTERN WHEELED SCRAPER CO.
Earth and Stone Handling Machinery. **Aurora, Ill.**

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS

1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

Total $376.17 or $5\frac{2}{3}$c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.
Hagersville, Ont. **Limited**

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  - National Sand and Material Co.
  - Sand and Supplies Ltd.
  - York Sand and Gravel Co.
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- Sewer Joint Asphalt
  - Canadian Mineral Rubber Co.
- Sewer Pipe
  - Britnell & Co.
  - Canada Iron Corporation
  - Dominion Sewer Pipe Co.
  - Gartshore Thomson Pipe Co.
  - National Iron Works
  - Ontario Sewer Pipe Co.
  - Smyth & Ryan
  - Standard Drain Pipe Co.
- Sewer Trenching
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  - Mussens Limited
  - Thew Automatic Shovel Co.
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  - Lundy Shovel & Tool Co.
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  - Provincial Steel Co.
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  - Morrison & Co., T. A.
  - Myers, Oakley
  - Queenstown Quarry Co.
  - Rogers Supply Co.
  - Roman Stone Co.
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The Property Owner's Investigation

IN the City of St. Thomas, Ont., the property owners on Gladstone Avenue contemplated petitioning the City Council to improve the roadways. They commissioned one of their number to visit various American cities, inspect pavements and make a report. Their investigator, Mr. E.A. Horton, visited various cities in New York and New Jersey. In his report he made the following statements:

> "I saw a 'Tarvia X' road in Rochester which extends from the city to the lake front, a distance of about six miles. It had been in use for eighteen months, and when I saw it, it was in excellent condition, with heavy traffic over it every day I....... inspected a piece of road in Newark......the surface when finished was smooth, and to my mind was one of the finest pieces of road it was my privilege to see. We then inspected another piece of "Tarvia X" which had been done by the Road Commission two years ago ...... Constant heavy traffic passes over this road every day, and trucks have loads of from 6 to 8 tons. Steel tired drays were used with most of their heavy traffic. This piece of road, as I saw it, did not show any wear whatever, and was apparently in as good condition as when it was put down.
>
> "I did not confine my attention to Tarvia roads as I saw (here he mentioned five of the commonest types of road treatment) and every other kind of road that is known.
>
> "I must say after making enquiries from people who were in no way interested, nor did they know I was seeking information, that everyone had a good word to say for the Tarvia road I have no hesitation in recommending it for use on our street, and at the estimate cost that has been given us, after seeing the many pieces of road that I have seen, I think it is the cheapest road that can be built."

The foregoing is quoted from the St. Thomas, Ont., Journal of February 20th, 1912. Since that date Gladstone Avenue has been constructed with "Tarvia X."

Anyone who will investigate the road problem with the same thoroughness will reach similar conclusions. Tarvia is made in three grades:

"Tarvia X" for use in constructing roads and pavements.

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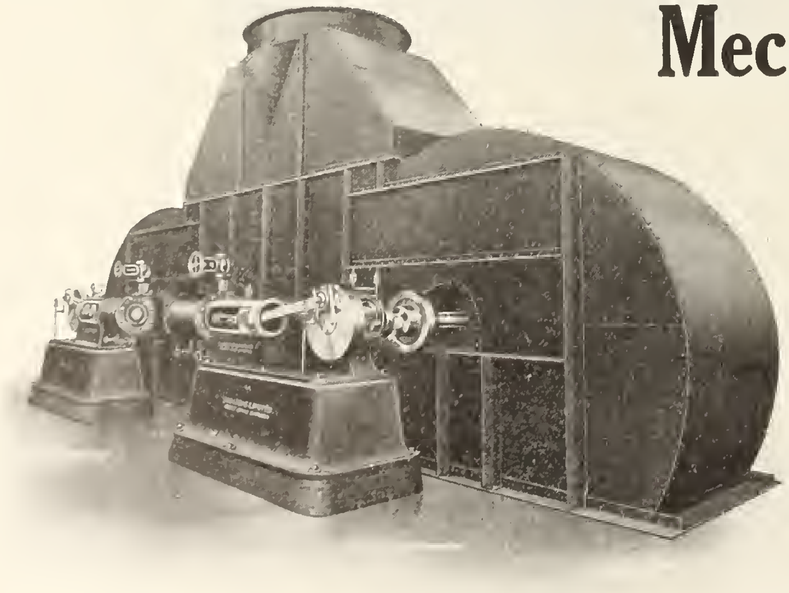

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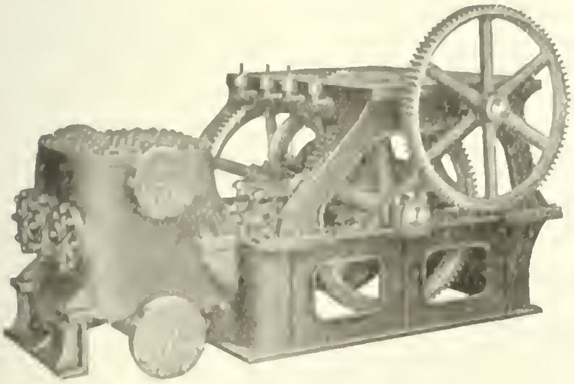

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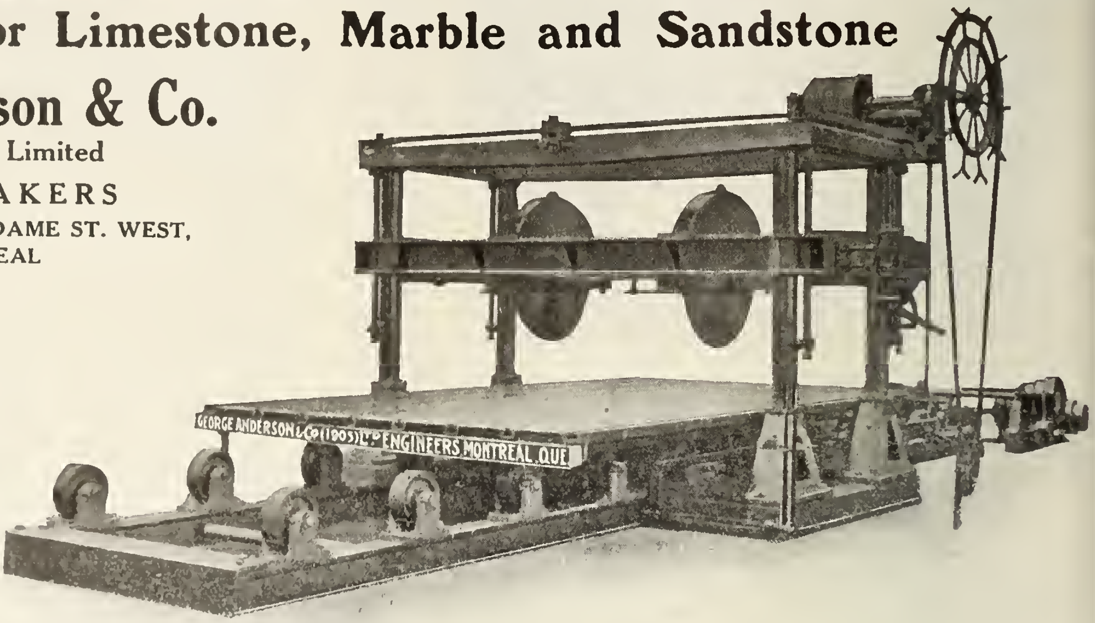

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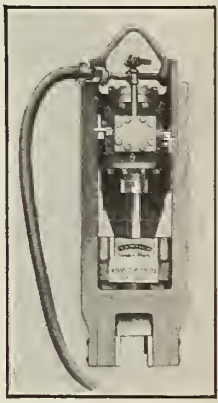

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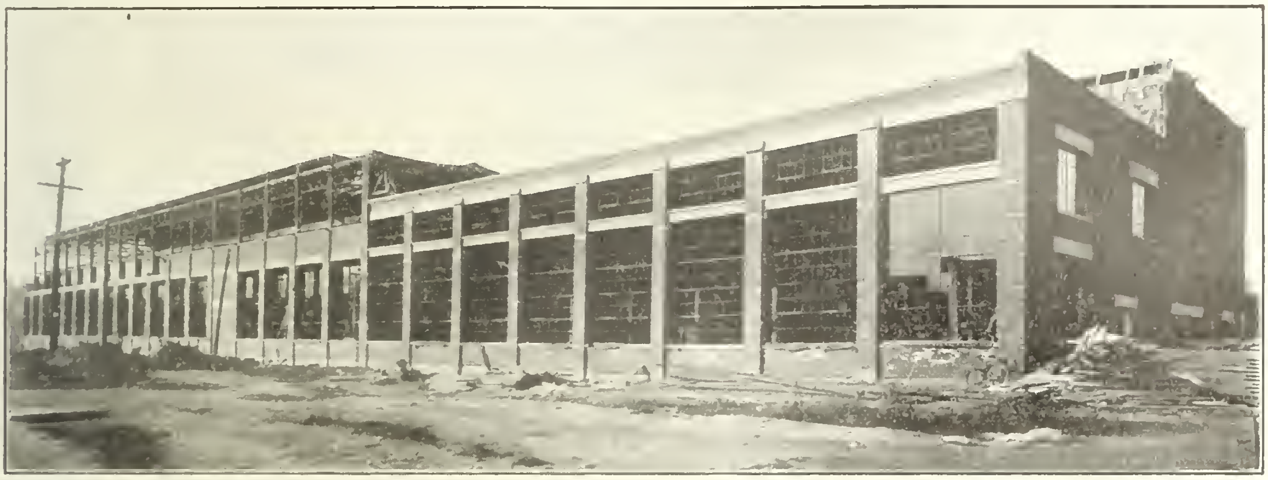

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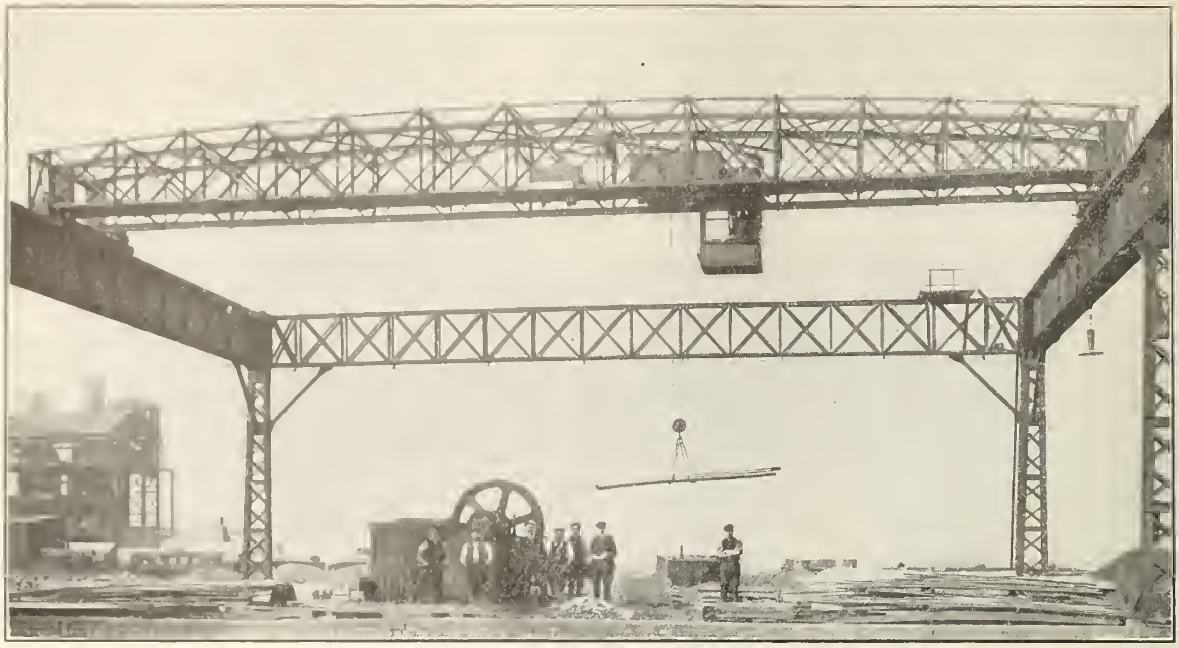

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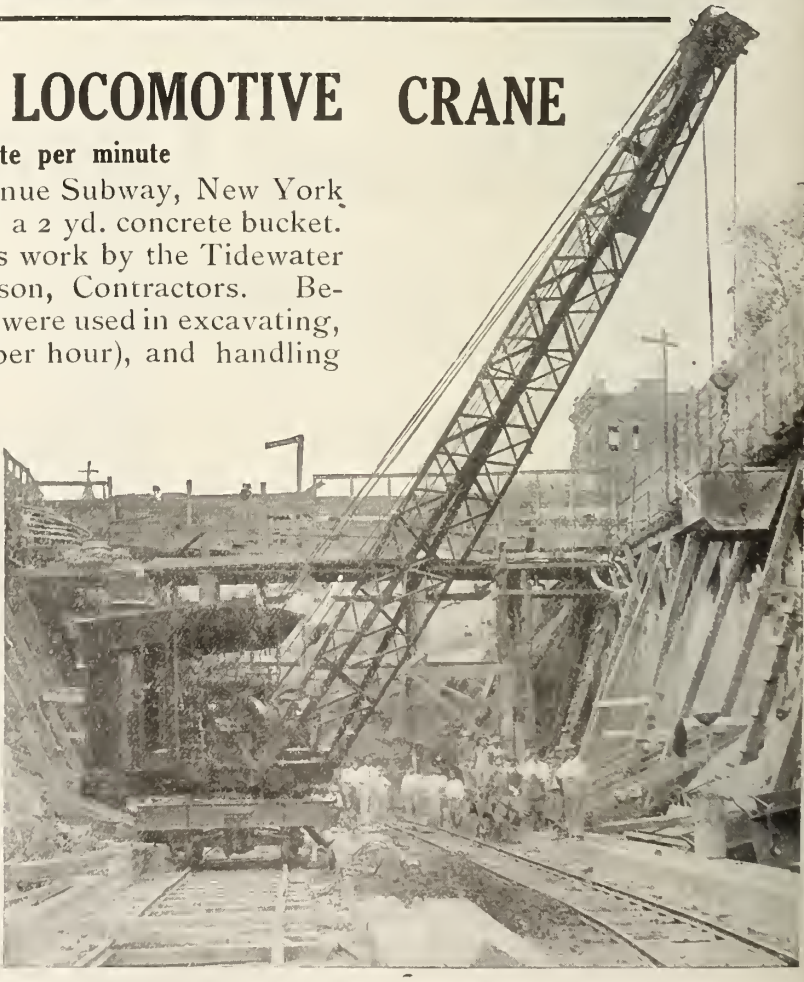

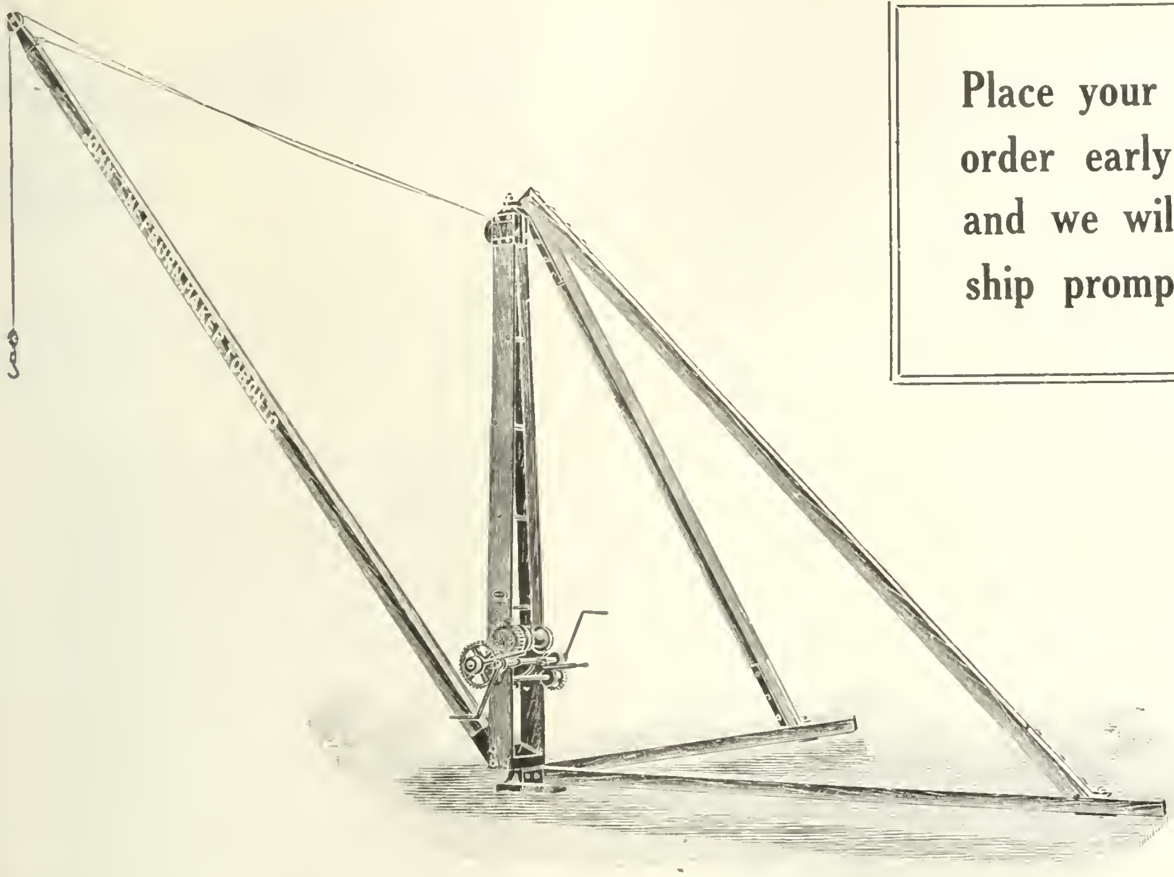
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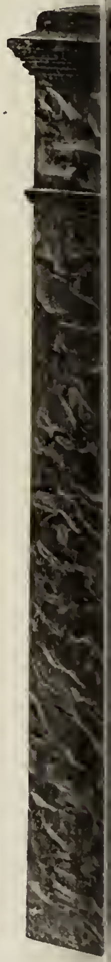

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Bring the Light to the Goods—
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To show most merchandise in its true color and quality, daylight is necessary. Daylight is one of the few things that we get for nothing but to put it where you want it is often a difficult problem. Most lighting problems of stores, warehouses, factories and showrooms can be successfuly solved by the use of

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This new department is under the general supervision of Mr. W. H. Lawrence, generally recognized as one of the best and most expert waterproofing engineers in the country. He has had a long, practical experience and is thus able to intelligently consult with architects and engineers as to the best method of applying waterproofing and mastic materials for all purposes.

Our refineries are under the supervision of experienced, competent men who have the technical ability and practical experience to turn out the best waterproofing products possible.

We are in position to not only supply, but also to apply materials for waterproofing residences, business structures, bridges, reservoirs, abutments or any other structure that it may be necessary to waterproof, as well as mastic for floors in breweries, abattoirs, factories, reservoirs, etc. We are prepared to undertake any waterproofing problem and guarantee perfect satisfaction.

Our nearest branch will gladly co-operate with architects or engineers on request.

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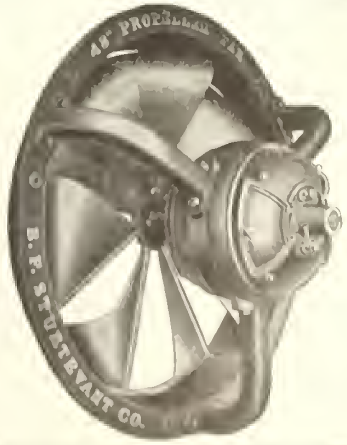

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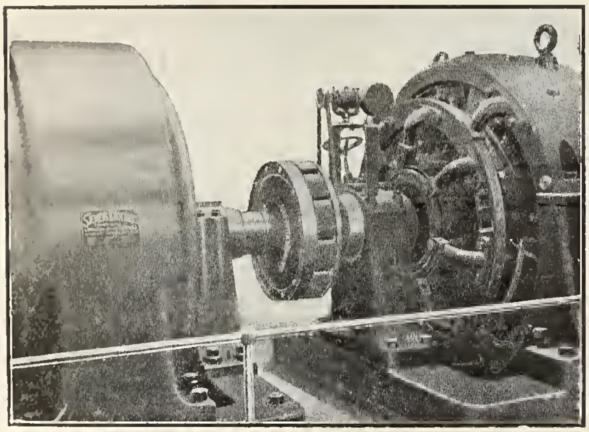

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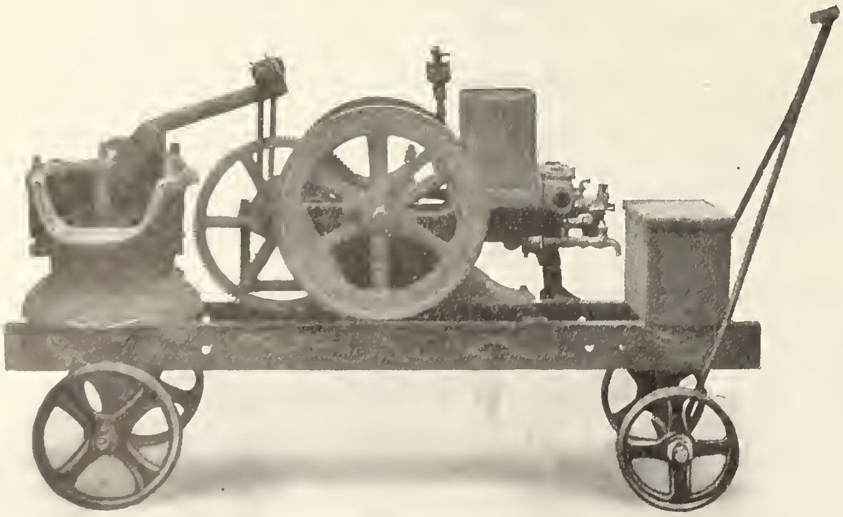

Capacity	Cost of Operation
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Saving

$8.00 to $10.00 per day, with greater efficiency than could be attained with hand power pumps.

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12 to 72 inches Diameter

Used extensively for Water Supply for Mines, Mills, Hydraulic Operations and High Pressure Hydro Electric Installations.

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Let us Tender on your Roofing and Waterproofing Specifications

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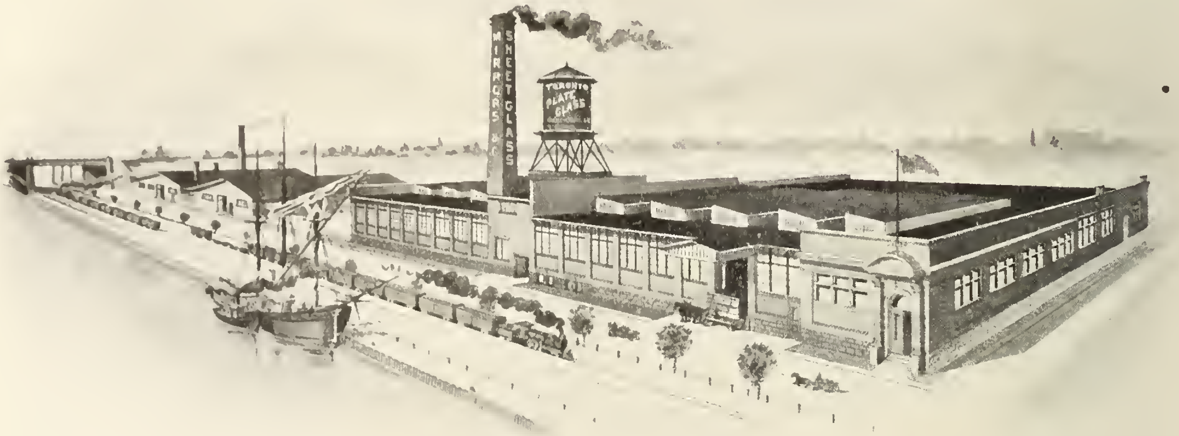

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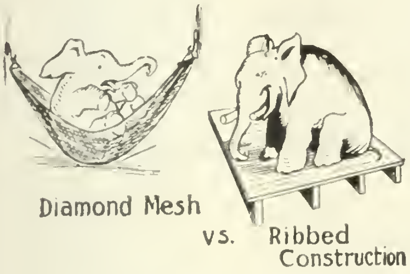
The Court of Experience has Decided in Favor of Herringbone Lath



Why Herringbone?

Because Herringbone is the most rigid lath

Examine the Herringbone ribs.
They are the joists that stiffen the Herringbone Fabric.
They turn excess plaster back on the Trowel.
They prevent the clinch from dropping off.
They save cost in plastering.

Because Herringbone is the self furring lath

The longitudinal ribs act as furring strips. The transverse strands are NOT against the backing. The lath is fully enveloped in mortar. Furring strips are not essential.
Furring strips cost nine cents per square yard.

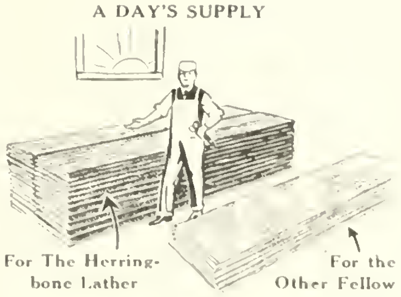
Best because it goes farthest

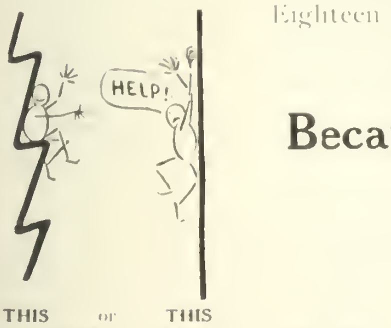
Because Herringbone requires no laps

Herringbone sheets have lock selvage edges.
They have 1½ inches end lap.
Herringbone lath lays up net as billed.
No material is wasted in side joints.
No material is wasted on account of crooked edges.
You don't pay for the end joints.

Because Herringbone is the most economical to erect

Herringbone stiffness means no bulges to be drawn flat.
Herringbone permits wider spacing of studs.
The selvage edge requires no wiring between studs.
One row of end staples holds both sheets.
Eighteen attachments per square yard does it.



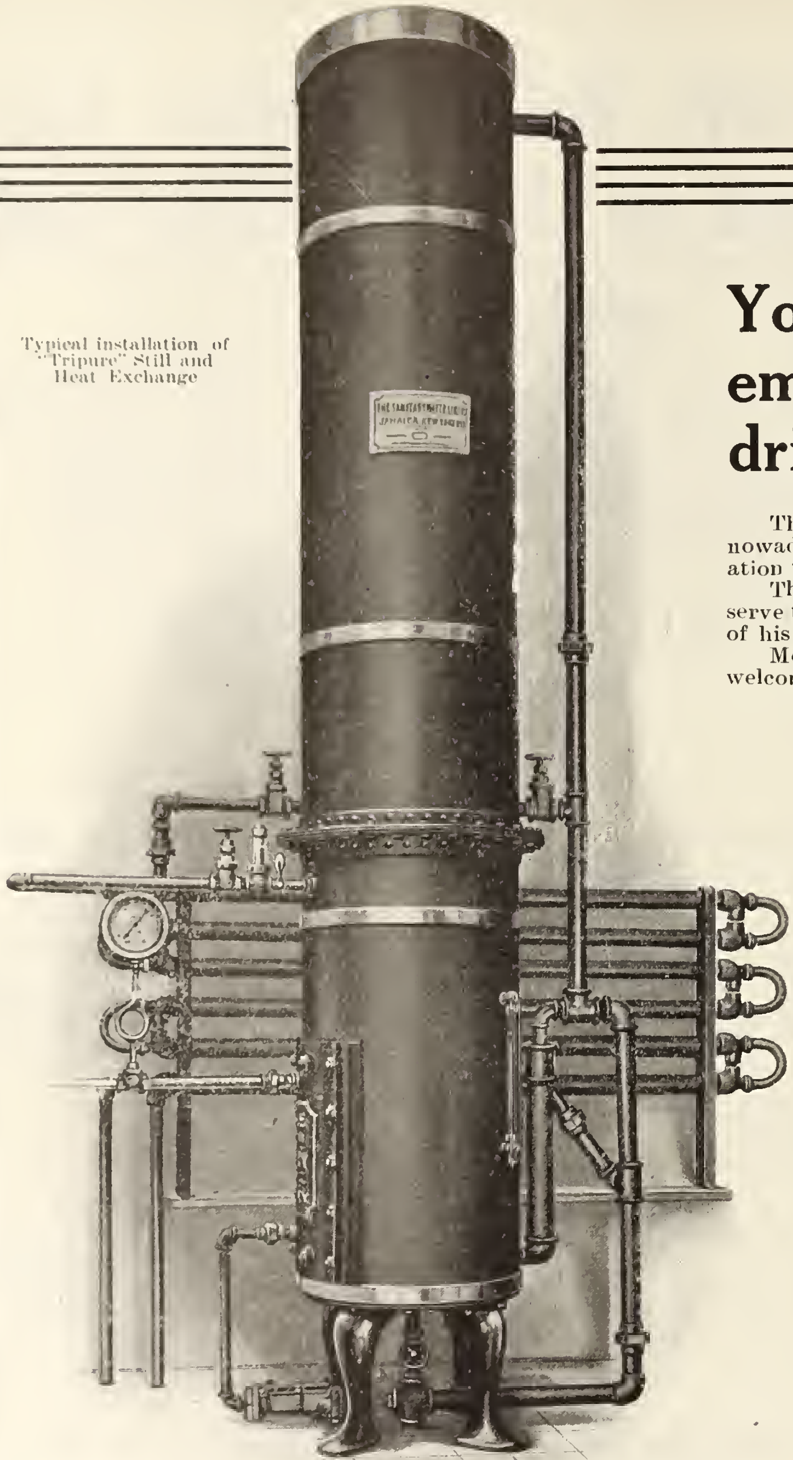


Something of a stunt for wet mortar

Because Herringbone lath has the best key

Those ribs are shelves when seen from the back.
They prevent the wet mortar dropping off.
The twisted cross strands lock into the mortar.
Thus the lath is thoroughly sealed in.

Clarence W. Noble, General Sales Agent
117 Home Life Building, TORONTO
Metal Shingle & Siding Company, Manufacturers



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You owe your employees pure drinking water

The employer's duty to his employees is nowadays getting a great deal more consideration than it used to.

The modern employer finds it pays to conserve the health of not only his office force, but of his mechanical staff too.

Most heads of institutions, therefore, will welcome an opportunity to investigate

this sure means of supplying pure water

Medical men and scientists are pretty well agreed that there is only one way to secure absolutely pure water—and that is by distillation. But hitherto it has been found impossible to obtain distilled water that the average person would drink—it tasted so flat. At last a process of distillation has been evolved, whereby the oxygen that is inevitably removed from water by distillation is replaced by pure oxygen again. This process is known as

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now just being introduced into Canada, but with a record of notable successes in the United States, where the factories and government institutions have installed Tripure Stills in large numbers.

You need a Tripure Still in your building

The cost of installation is moderate, and once a Tripure apparatus is in operation, it produces hundreds of gallons of pure water at practically no cost, because the heat in an ordinary steam heating coil is sufficient to operate it.

Investigate this matter—write to-day

You owe it to yourself and your employees to become posted on this wonderful invention. Drop a line tous to-day and ask for the Tripure book. It contains some really valuable facts on Pure Water.

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Strength — Rigidity — Weatherproofness

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Special Sash features: Steel Glazing Clips, attached. Solid Bronze Hinges, noncorrosive. Double Contact Ventilators.

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Kahn Sash can be manufactured to any size with the required amount of ventilation.

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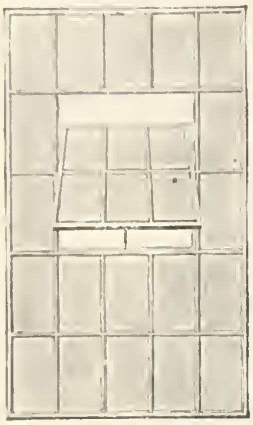
Ormsby-Lupton Steel Sash



Our Sash is made of miter-joint construction, giving you the neatest appearing Steel Sash on the market.

The joint is locked on the horizontal bar, making the Ormsby-Lupton Steel the strongest.

Our Vents are made and hung by expert vent hangers, thereby dispensing with wind, rain and any other elements.

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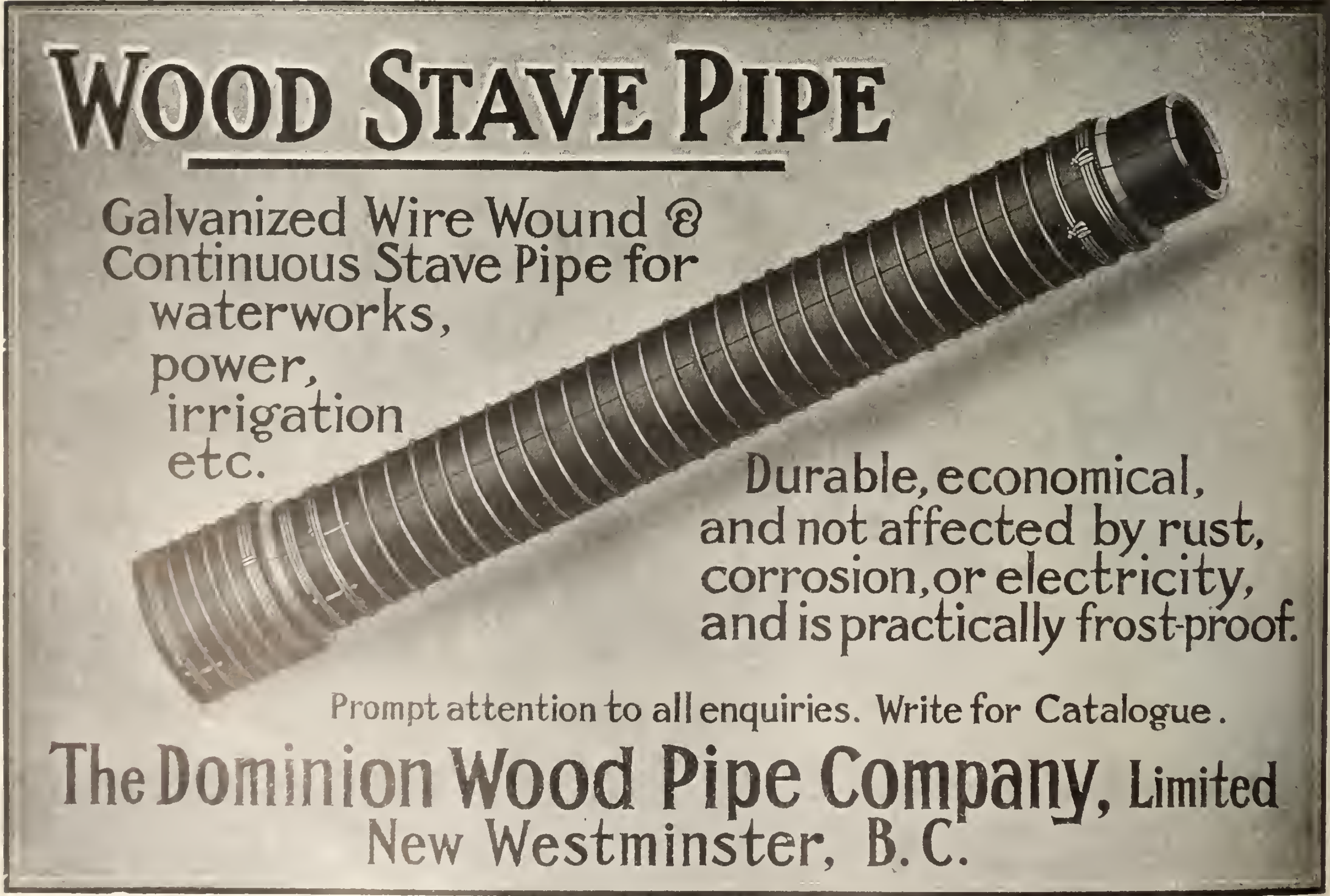

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Durable, economical, and not affected by rust, corrosion, or electricity, and is practically frost-proof.

Prompt attention to all enquiries. Write for Catalogue.

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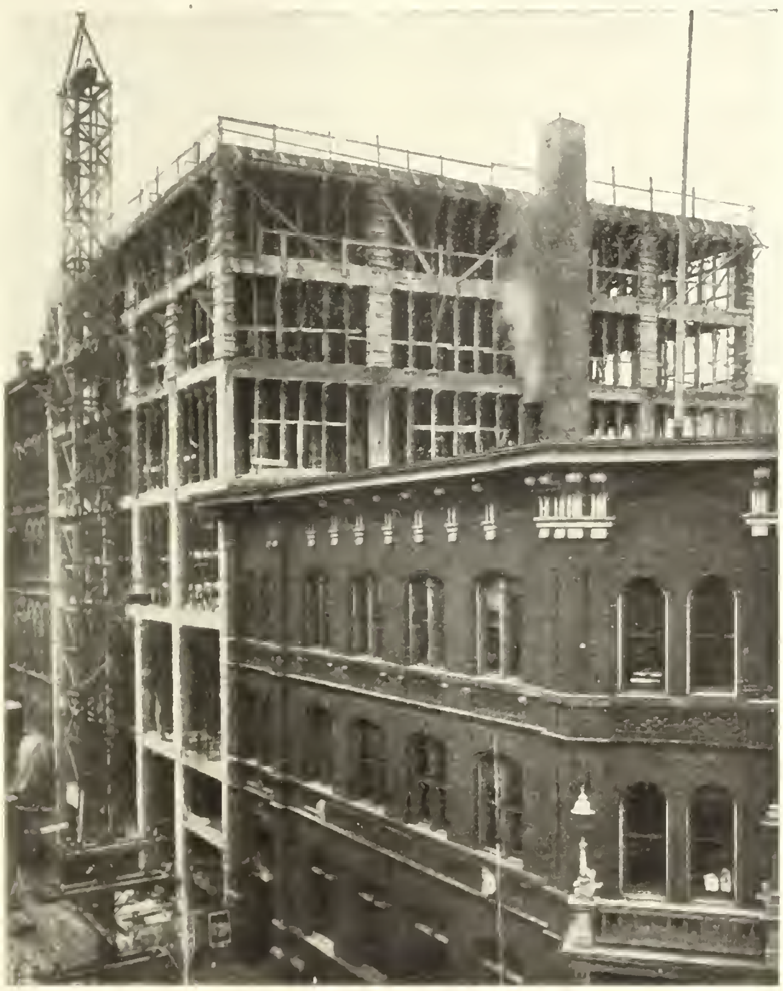
Triangular Mesh used exclusively in this new Watkins Building at Hamilton, Ontario



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Name	Location	Architect
Graphic Arts Building	Richmond and Shephard Sts., Toronto	F. S. Baker
Forest Lawn Mausoleum	York Mills, Ont.	Green & Wicks
Power House for Ont. Developement Co.	Niagara Falls, Ont.	E. J. Lennox
Central Y. M. C. A.	College Street, Toronto	Burke, Horwood &
Carnegie Library	Owen Sound, Ont.	Forster & Clark
West Town Hall	Montreal, Que.	Peden & McLaren
Children's Home	Weston Sanitarium	Denison & Stephen
Y. M. C. A.	Galt, Ont.	Shattuck & Hussey
Paving for Mutual Life Insurance Co.	Waterloo, Ont.	Darling & Pearson
Masonic Temple	Ottawa, Ont.	J. A. Ewart
Fire Hall	Ottawa, Ont.	F. C. Sullivan
Addn. to Sick Children's Hospital	Elizabeth Street, Toronto	Stevens & Lee
Anti-Tuberculosis Hospital	Ottawa, Ont.	A. LeB. Weeks

CHURCHES

Name	Location	Architect
ST. ALBAN'S CATHEDRAL	Albany Avenue, Toronto	Cram, Goodhue & and Symons & Ra
ST. PAUL'S (Anglican)	Bloor Street East, Toronto	E. J. Lennox
McVICAR MEMORIAL CHURCH	Montreal, Que.	McVicar & Heriott
ST. GILES PRES. CHURCH	Hamilton, Ont.	Stewart & Witton
DUFFERIN ST. PRES. CHURCH	Toronto, Ont.	J. W. D. Greig

BANKS

Name	Location	Architect
Union Bank	Queen Street West, Toronto	Darling & Pearson
Molsons Bank	Lucknow, Ont.	Walter Stewart & S
Molsons Bank	Drummondville, Que.	P. J. Turner
Union Bank	Gerrard Street and Greenwood Avenue	H. B. Gilbert
Bank of Ottawa	Pembroke, Ont.	Morris & Moore

STORES, FACTORIES AND GARAGES

Name	Location	Architect
Murray-Kay Warehouse	Ontario Street, Toronto	Page & Warrington
Imperial Tobacco Company	Granby, Que.	Imperial Tobacco C
Fremes Warehouse	Adelaide and Peter Streets, Toronto	Langley & Howland
The Young Company's Warehouse	Sudbury, Ont.	J. Francis Brown
Independent Cloak Company	Richmond Street West, Toronto	I. Feldman
Stores for Miller & Rosenthal	Lachine, Que.	W. P. Aquin
Standard Silver Company	Madison Avenue, Toronto	Owners
Wolseley Motor Company, Garage	Avenue Road, Toronto	E. J. Lennox
E. M. F. Garage	Alexander Street, Toronto	H. J. Smith
C. S. Boone, Garage	Huntley Street, Toronto	Chadwick & Beckett

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SCHOOLS

ne	Location	Architect
gh School	Weston, Ont.	Munro & Mead
gh School	North Bay, Ont.	T. R. Burt
tral School	Burlington, Ont.	Munro & Mead
demy	Thurso, Que.	C. St. Jean
ool for Boys	Blue Bonnets, Que.	J. D. Viau
lic School	Echo, Ont.	Geo. W. Hall
lic School	Etobicoke, Ont.	P. White Lindsay
ninion Park School	Lachine, Que.	J. D. Viau
ntenac School	Hochelaga, Que.	J. Dalbe
lic School	Welland, Ont.	C. M. Borter
lic School	North Bay, Ont.	H. W. Angus

APARTMENT HOUSES

ne	Location	Architect
kdale Mansions	Queen St. and Beatty Ave., Toronto	S. A. Waggett
Strathcona	Queen Street West, Toronto	Owner
Baldwin	Baldwin Street, Toronto	A. E. Yollës
lgonquin	Tyndall Avenue, Toronto	W. B. Charlton
elma Apartments	Grosvenor St. and Surrey Place, Toronto	Mallory & Thatcher
ege Heights Apartments	St. Clair Ave. and Oriole Rd., Toronto	Edwards & Saunders
ley Court	Kendall Avenue, Toronto	J. Hunt Stanford
ufort Apartments	Davenport Rd. and Dupont St., Toronto	Ellis & Connery
a Hall	Sault Ste. Marie, Ont.	C. P. Meredith
gsley Mansions	King St. and Jamieson Ave., Toronto	Redmond & Beggs
Roslyn	Glen Rd. and Howard Ave., Toronto	J. A. Harvey

RESIDENCES

ne	Location	Architect
H M. Pellatt	Wells Hill, Toronto	E. J. Lennox
Caldwell	Forest Hill and Heath St., Toronto	F. S. Baker
Kahnert	Spadina Avenue, Toronto	S. H. P. Watson
ho Fairmount Court	Mile End, Que.	Jos. Perrault
Russell	Russell Hill Road, Toronto	F. S. Baker
rance Gates	St. Hillier, Que.	Peden & McLaren
or Murray	Whitney Avenue, Toronto	Page & Warrington
I. Ewing	Westmount, Que.	G. W. White
hite Lindsay	Weston, Ont.	P. White Lindsay
Layton	Westmount, Que.	J. Ogilvy Harris
mas Rea	Mount Clair Avenue, Toronto	C. P. Band
Tudhope	Orillia, Ont.	F. Webb & Son
nce Gates and Lodge for Sir H M Pellatt	King, Ont.	P. White Lindsay
oulter	Balmoral Avenue, Toronto	E. G. Wilson
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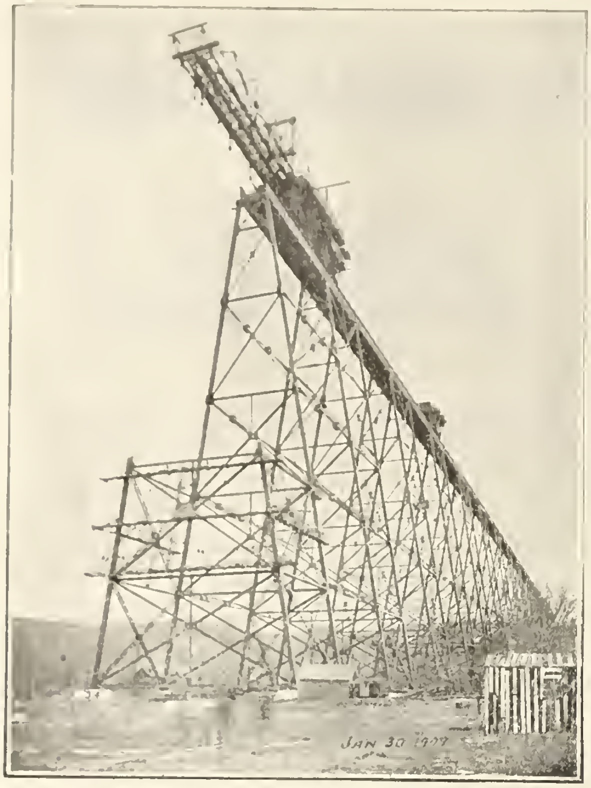

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Have stood the test of time and given satisfaction wherever they have been placed.

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We have shipped Engines into almost every part of the Dominion and will gladly put you in touch with our nearest customer.

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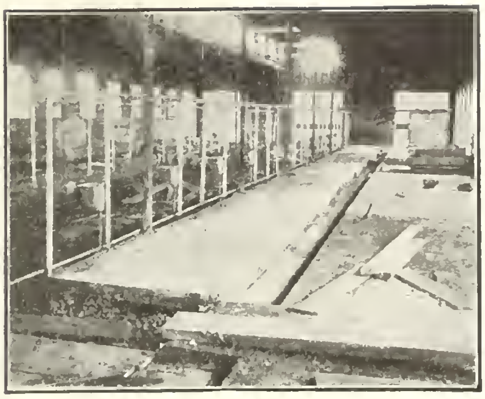

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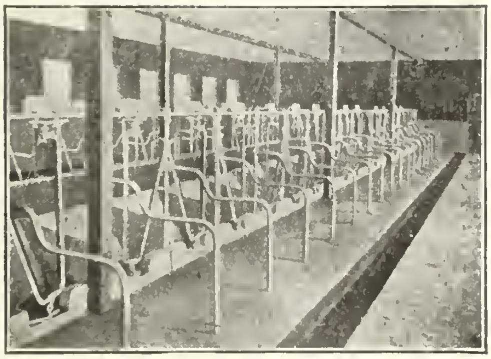

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These show the equipment in the Barn at the Ottawa Dairy. It was completed this fall and fitted with

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have five special patented features that save enough feed and labor to pay for the whole equipment in a year. Read of the value and superiority of the BT Equipment and know why it is used exclusively on the Dominion and Provincial Government farms, and by the big dairymen throughout the country.

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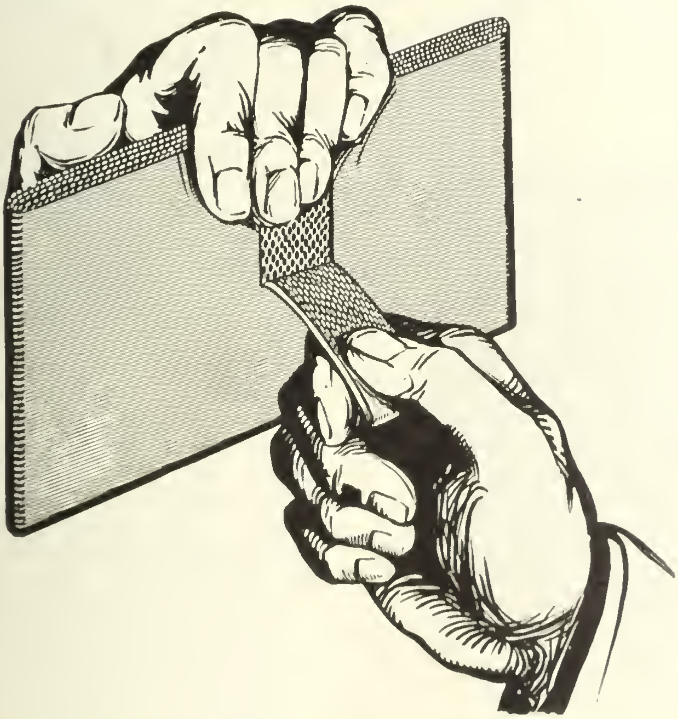

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In the choosing of belts our booklet would be of great assistance to you. We supply it free. Write to our nearest branch for one.

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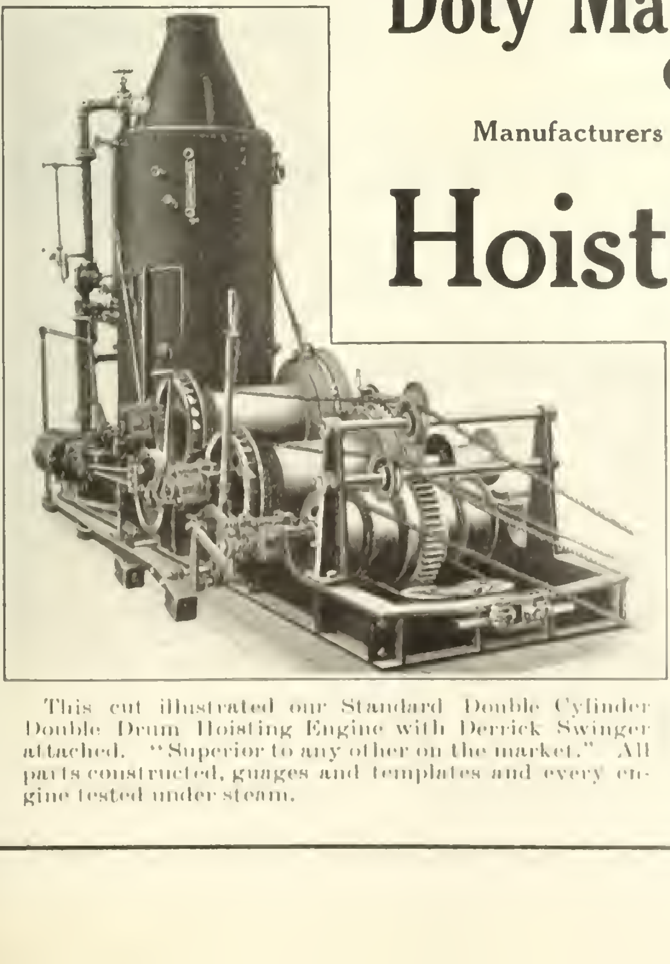

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Specializing in Engineering—Its Advantages and Disadvantages

To Specialize or Not To Specialize: that is the question that confronts the embryo engineer to-day. There is a tendency to regard this problem as one peculiarly affecting engineering, but, after all, it is a consideration which has to be faced in every walk of life nowadays. Specialization is the feature of the twentieth century.

Like everything else, specialization has its pros and cons and these must be studied by every individual before he decides the momentous question for himself.

Often a man is practically forced by circumstances to become a specialist. Particularly is this the case in any large office. There, of necessity, the work is divided into branches—sewerage, waterworks, roadways, architectural works, etc., and one man is put in charge of each branch, becoming in the natural order of things a specialist in that particular work. As a rule, such a man gets more and more into a groove. He loses the widening knowledge which a more general experience gives; his outlook becomes narrow; and he comes to regard his special subject as the one above all to be considered. In such cases the attendant financial risk should not be overlooked. Supposing a man after spending the greater part of his life in studying one branch of his profession and working up to a remunerative position should lose his appointment. Is it not reasonable to suppose that with his intensive yet limited powers he would experience considerable difficulty in making fresh connections? The man with a fair general knowledge of all branches certainly has the advantage in this respect.

Looking at the other side of the picture, and considering the advantages of specializing, the first is that as a specialist a man has a better chance of distinguishing himself in his profession and of perfecting the science of his particular branch. If successful, he is looked up to as being the man to consult in the event of any problem arising. He becomes the pioneer of facts appertaining to his subject; he plays an active and progressive part and, perchance, adds something to the sum of human knowledge. From the personal viewpoint the lot of the specialist is an attractive one: he occupies a prominent position and draws a big salary.

Rosy as the prospects may appear, however, there are other questions involved, and which, neglected, mean failure. The first is the eternal question of fitness—adaptability. The young engineer must examine himself and be thoroughly convinced that he has a particular bent in the direction of a certain branch of the profession before he decides upon specializing. Only an absorbing interest in one subject, together with marked ability, justifies his taking the step.

We cannot but think that the average man's best chance lies in the acquisition of general knowledge and in the development of business capacity. The latter is undoubtedly the secret of success in all walks of life. Even the prospective specialist should endeavor to become a good business man while gaining a practical and theoretical knowledge of his work—and the more general knowledge that he can assimilate while specializing, the better. A general training is an indispensable foundation to special work and a long period of probation must be served before the engineer can give himself up to one particular branch.

There is, and always will be, room for the general practitioner. The steep and slippery way of specialization may lead to greater heights, bigger pay and all that sort of thing, but there is much to be said for general practice. In any case the young engineer must walk before he climbs and must learn to know "something of everything" before he can pretend to know "everything of something."

Engineering Mathematics

A recent brilliant address by Sir William White, the distinguished naval architect, before the Mathematical Congress at Cambridge, England, furnished a very striking discussion of the relations between mathematics and engineering, says the Engineering Record, commenting editorially. No educational topic has been more debated, or to less effect. Until comparatively recent years engineers have been divided into two schools, one of which had precious little faith in mathematics as such, a position exactly reversed in the case of the other group. The difficulty came largely from the fact that mathematics as taught, even in engineering schools, has seldom been wholly practical, for the reason that it has not generally been taught by working engineers, but by skilled mathematicians, resourceful and adept in purely methematical work, but blind leaders in applying their mathematical technique to problems which of necessity dealt with the unknown variables of engineering operations. Sir William White points the difference in saying that the mathematician is primarily concerned with the bearing of mathematics in engineering science, while the engineer is primarily concerned with the results to which mathematics can aid him, it is true, but which must be attained anyhow. The difference between pure, and even so-called applied, mathematics and engineering mathematics lies in the fact that the former imply orderly development from known data, while the successful application of the latter depends on the development of principles from arbitrary data. The one is a step by step process, the discontinuities of which have to be bridged by empirical processes. The other is a continuous process, orderly and definite even to the uttermost intricacy.

The first type may ultimately be merged into the second in many instances, yet to do so may require an amount of investigation forbidden by the conditions of the problem. And the difference between the great engineer and the little engineer lies largely in the tact and skill with which the bridging process is conducted. The skilled engineer uses mathematics as his most powerful single tool, but when he cannot, without losing an unwarrantable amount of time, succeed in applying it to a particular task, he must lay it aside and take up arbitrary experimental methods by which to reach a point at which he can again pick up his mathematics and see his way clear to cutting through difficulties with them. In Sir William White's own specialty, for example, it has been found that in certain problems of ship design as regards strength, mathematics soon reaches a point where it temporarily ceases to be useful on account of the intricacy of the problem and lack of data which might serve to simplify it. At this point tentative methods really amounting to extrapolation from experiment have to be adopted in order to reach a point where further tentative mathematical methods may clear the way for the next step.

As the problem goes on further still other limitations have to be met. Froude, for example, worked out with profound practical and mathematical skill some of the relations existing between ships of various sizes so that extremely valuable information could be derived from models, but even now the variables which depend upon size have not been worked out with any completeness for the single item of the propeller. And so the story goes on with variations through almost every department of engineering. One cannot get ahead rapidly without the free and skillful use of mathematics, but he cannot get ahead rapidly at all points by this means alone, and has at certain stages of his work to fall back on empirical data, and one of the greatest services that mathematics can do the engineer is in showing him how to plan his experiments and how to utilize his data with the greatest efficiency. It is just at this point that the engineer unskilled in mathematics is apt to fall down. There are great masses of experimental data to-day in all branches of engineering which need keen mathematical analysis to disentangle from the subsidiary facts, which merely lead up blind alleys, the real facts, which lead far forward. And to give the engineer during his training the firmest possible grip on mathematics as a weapon of attack in physical problems should be the fundamental purpose of mathematical instruction in engineering schools.

February 26, 27 and 28 next are the dates of the convention of the Ontario Good Roads Association. Next year the meeting will be held in the Machinery Hall of the Toronto Exhibition grounds instead of in the York County Building as formerly. This arrangement has been made in order to facilitate the holding of an exhibition of road-making machinery. Prominent Canadian and United States engineers will address the convention and it is planned to make the event the greatest of its kind ever held in this country. The president of the Association is Mr. W. T. Kennedy.

Arrangements are now practically completed for the third American Good Roads Congress which is to be held under the auspices of the American Good Road Builders' Association in Cincinnati on Tuesday, December 3. The exhibition of road and street building machinery and materials will be on a most complete scale. The papers scheduled for presentation cover all phases of the work from the standpoint of both the engineer and the contractor. One of the papers is on Highway Bridges and Culverts, by Mr. W. A. McLean, Provincial Engineer of Highways for Ontario. It is hoped to publish this paper and other addresses in an early issue of the Contract Record.

The Tale of a Brick

'Twas the voice of a brick in a building high,
  A brick of the lower tier;
"Behold my brothers mount up to the sky
  And leave me forgotten here.
But I hold my place, and I bide my time,
  That must come to the great and small;
And though I be lost in the dirt and grime,
  I'm the hope of the whole high wall.

"There be brothers of mine at the very top
  Of the building so proud and high.
And they think to go forward and never stop
  This side of the sun-kissed sky.
'Oh the poor dull bricks of the lower wall,'
  They cry as they look below,
But their harsh words ruffle me not at all
  For the base of their strength I know.

"It is on my shoulders they upward mount
  To their place in the sunlight fair,
And, though far below them, I still account
  Myself with the highest there.
For the law that governs I understand,
  And the law of the world to be;
It is this: We are all as one in the land,
  As the drops are as one in the sea."

—**Charles Eugene Banks**

Life's Code

"Make no little plans; they have no magic to stir men's blood, and probably themselves will not be realized. Make big plans; aim high in hope and work, remembering that a noble, logical diagram, once recorded, will never die, but long after we are gone will be a living thing, asserting itself with ever-growing insistency. Remember that our sons and grandsons are going to do things that will stagger us. Let your watchword be order and your beacon beauty."—Daniel H. Burnham.

More than £14,000,000 is to be spent on the great new dock scheme at the Port of London, England. The Port Authority has just accepted tenders amounting to £2,350,000 for preliminary extensions and improvements. This work forms the first portion of the proposals presented for the consideration of the authority by Lord Devonport in January last year.

TORONTO

A Toronto-Featured Number

¶ The engineering and constructional development set forth in the pages of this issue are a revelation as to the activities of a city which in many respects may be regarded as the greatest in Canada. The articles published herein comprise a brief historical sketch of the city's growth, a comparative review of building operations, illustrated descriptions of the more noteworthy buildings completed recently and now under construction, supplementary particulars of the Harbor Commission's proposed development, and a detailed statement of the work and practice of the various branches of the Works Department—the complement of the issue being in the form of biographical and other informative data.

TORONTO, "a place of meeting," has justified its name—given to it over a century ago by the Huron tribe of Indians. We may be sure that these ancient warriors never dreamed that the spot that they had named Toronto would become a place where the east would meet the west.

The first real date of importance to Toronto was in May, 1793, when Lt.-Col. John Graves Simcoe, the first Lieutenant-Governor, formed the first parliament of Upper Canada and named York (now Toronto) as its capital. In that year Yonge street was first opened by the soldiers under Lt.-Col. Simcoe, and after that, Dundas street.

Newark (Niagara) was first destined to be the capital, but this place was too near the United States, so that York was chosen and its splendid natural harbor was one of the chief factors in determining on it. In 1803, Parliament voted money for roads and bridges and the town of York was then further developed. The streets at that time were all given royal names, those in existence being King, Queen, Duke, Duchess, Frederick and George. In the year 1812 York was practically razed to the ground by the United States troops on April 25th, but at the close of the war and during the following twenty years extensive building operations took place. In the year 1821 Parliament was convened in new buildings at York, which however, were burnt three years afterwards. The year 1831 is an historical one in the history of York, as on the 6th of March the Royal assent was given to its becoming an incorporated city under the name of Toronto. The city was divided into five wards and there were two aldermen and two councilmen for each ward. On April 3rd, 1831, William Lyon Mackenzie was elected the first mayor of Toronto. One of the first works undertaken by the council was to repair and extend the sidewalks and roads. The sidewalks in those days were somewhat primitive, as they consisted of two 12-in. planks laid longitudinally on the principal streets. It is interesting to note that the city endeavored to borrow $1,000 from the Bank of Upper Canada for extending the sidewalk, but as they were already indebted to this bank for $9,000 their request for the loan was refused. The Farmer's Bank however, were more generous and provided the money on the personal security of the Mayor and City Council. The population of Toronto was then somewhat under 10,000 and its rateable value did not exceed three-quarters of a million dollars. An almost overwhelming catastrophe occurred at this time by way of an outbreak of Asiatic cholera, and it is said that every twentieth inhabitant died.

That Toronto in 1836 was not an altogether desirable place to live in is evident from the fact that Mrs. Jameson, wife of the then Provincial Vice-Chancellor, wrote: "What Toronto may be in summer, I cannot tell. They say it is a pretty place. At present, its appearance to me, a stranger, is most strangely mean and melancholy. A little ill-built town, on low land, at the bottom of a frozen bay, with one very ugly church, without tower or steeple; some Government offices, built of staring red brick, in the most tasteless vulgar style imaginable; 3 ft. of snow all around; and the grey, sullen, wintry lake, and the dark gloom of the pine forest bounding the prospect—such seems Toronto to me now."

In 1844, ten years after its incorporation, the population of Toronto had doubled and its trade and commerce had largely increased. The streets of Toronto were first lighted by gas in 1840. One of the great factors in developing the importance of Toronto was the railway, which was built in 1853. This line ran to Aurora and was known as the Ontario, Simcoe and Huron railway. In the year 1857, a bad commercial panic broke out, even some of the oldest established houses being compelled to close their doors. This year was a particularly disastrous one and without doubt many of the inhabitants actually starved to death. In the years 1872-4 great progress was made throughout the city which, by this time had been very largely extended, and from that time on, and particularly during the next decade, the growth both in the size of the city and in its population was phenomenal.

In 1851 the population was 30,775; in 1856 45,000; in 1871 56,092; in 1881-86,415; in 1891 144,000; in 1901 221,583; and in 1911-425,407.

In 1871 the realty value was $22,037,470 and in 1881 this figure was increased to $42,020,155. Coming down to more recent times the total assessment in

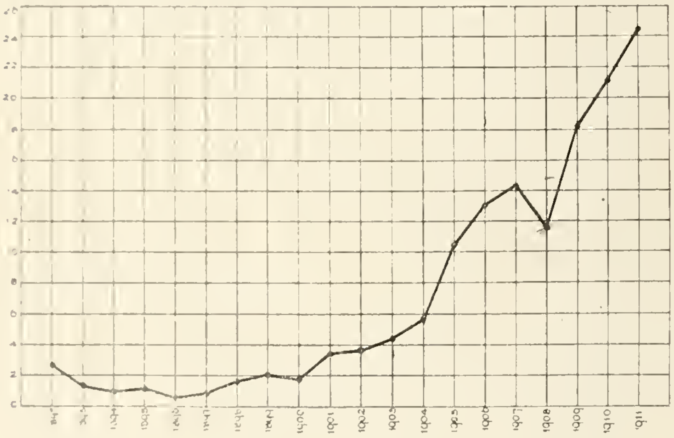
1890 was $130,527,017; in 1898—$120,681,312; in 1903—$138,645,995; in 1908—$206,385,253; in 1909—$233,953,105; in 1910—$270,086,332; in 1911—$306,751,673; in 1912—$343,739,914, and in 1913—$426,127,851.

The increase in building activity is shown by a comparison of decades in the next paragraph, but it is of interest to record that in 1905 the total number of buildings assessed was 47,958; in 1907—55,276; in 1909—65,811, and in 1911—77,186.

A Comparison of Toronto's Building Returns of the Last Two Decades

Looking back over the last two decades the yearly records of the building departments are illuminating as to the comparative progress made by the city of Toronto.

Dealing first with the ten years' period from 1892 to 1901 we find little variation. The ruling tendency was to decrease. This is apparent from the following yearly returns: 1892, $2,721,305; 1893, $1,375,895; 1894, $1,020,215; 1895, $1,346,810; 1896, $657,168; 1897, $947,611; 1898, $1,701,630; 1899, $2,010,446; 1900, $1,903,136; 1901, $3,568,883. It will be seen that actual decreases occurred in four years out of the ten, while it was only in the last year of the decade that the figure established in the first year was equalled and surpassed. For eight successive years following 1892 the building permits fell short of a total of less than 2¾ millions; in only one of those eight years—namely in 1899—was the two-million-dollar mark reached.



Graphic illustration of the increase in Toronto's building 1892-1911

As contrasted with the record of the decade we have just considered, the increases registered from 1902 to 1911 were phenomenal. In 1902 the permits amounted to $3,854,923, while in 1911 the figures were more than six times that total, namely $24,374,539. The returns of the intervening years are eloquent as to the steady progress made in the constructional field of Toronto. Increases were registered in every year but one and that was in 1908 following a depression that resulted in the universal stringency of the money market. It is significant that while 1908 fell away from 1907 to the extent of some 2½ millions, 1909 registered the remarkable increase over 1908 of nearly 6½ millions. The actual figures representing the estimated value (which is always a conservative one) of the building permits during the last ten years are as follows: 1902, $3,854,823; 1903, $4,356,457; 1904, $5,896,120; 1905, $10,347,910; 1906, $13,160,398; 1907, $14,225,800; 1908, $11,795,436; 1909, $18,139,247; 1910, $21,127,783; 1911, $24,374,539.

From 1902 until 1911 the value of the new buildings erected in Toronto grew from year to year until the figures reported by the City Architect's Department as the total for 1911 show an increase of 583 per cent. in building operations in a decade. These remarkable figures are supported by equally striking statistics in other lines of progress in proving that Toronto, the "City of Churches" and the "City of Homes," is also the "City of Factories." Indeed the two latter terms are almost synonymous by reason of the fact that after a city passes a certain stage, its further growth in population depends largely on the advantages it can offer as a location for industries. That Toronto is exceptionally favored from this point of view is shown by the fact that 110 new factories and 77 new warehouses valued at $3,249,425 were included in the building permits issued by the city architect during the year 1911 and that the manufacturing interests of the city represent a capital of $85,000,000 employing 70,000 hands and paying an annual wage bill of $29,000,000. This rapid growth as a manufacturing city is undoubtedly due in a large measure to the advantageous situation of Toronto on the finest harbor on the great lakes and the fact that three transcontinental railroads place her in direct communication with all parts of the continent while the labor market available for all classes of industry is second to none.

Material Used by Toronto Works Department

Illuminative as to the activities of the Works Department (detailed by Branches in this issue) is a statement of the material purchased and delivered this year. The records are particularly suggestive as to the relative use of the various materials. Up to the week ending Saturday, November 23, the quantities for the year 1912 were as follows: sand, 24,660 yds.; cement, 65,167 bbls.; stone, 53,422 tons; coal oil, 17,252 gals.; sewer brick, 676,473 bricks; paving block No. 2, 117,027 blocks; paving block No. 1, 1,245,140 blocks; paving bricks, 80,630 bricks; asphalt, 1,000 tons; vitrified sewer pipe, 158,000 ft.—roughly 29 miles of pipe, varying from 6 in. to 24 in. in diameter, with the majority 6 in, 12 in. and 18 in.

Toronto's Noteworthy Buildings—Public, Commercial and Residential

We reproduce herewith illustrations of some of the more noteworthy of Toronto's recent building undertakings. Elsewhere in this issue will be found special articles relating to the larger work now under way, but the following summaries will suffice in respect to the buildings shown herewith, as in a number of cases detailed descriptions have already appeared in this journal.

Foremost mention should be made of the Toronto General Hospital. Progress on this noteworthy group of buildings has now reached an advanced stage. The site is located within three minutes' walk of College and Yonge streets. The exact dimensions of the site are 600 by 700 feet. The cost is estimated at $2,500,000. Messrs. Darling & Pearson are the architects. A noteworthy feature of this work is the specially designed brick used. The entire contract for this brick was awarded to the Don Valley Brick Works.

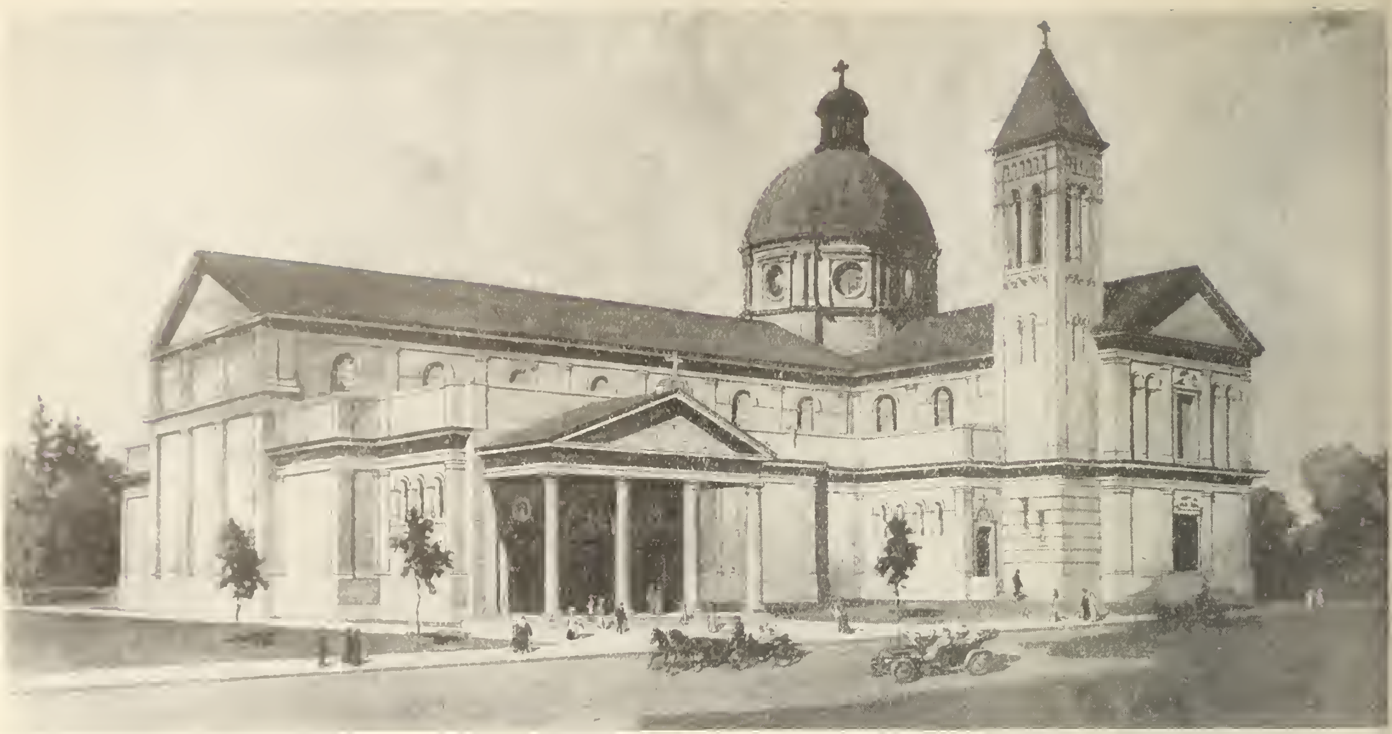
Above the view of the hospital is shown a perspective of Burwash Hall, the students' residence of Victoria College, the architects for which are Messrs. Sproatt & Rolph. This building is an excellent example of the Collegiate Gothic style. Construction is now well advanced.

A perspective view is shown of the prize design

Burwash Hall, students' residence, Victoria College. Architects, Messrs. Sproatt & Rolph

Bird's eye view of the Toronto General Hospital, from a perspective prepared by the architects, Messrs. Darling & Pearson. The buildings are now rapidly assuming this form.

The design of Messrs. Ross & MacFarlane, awarded first place in the recent competition for plans for the new Toronto Technical School

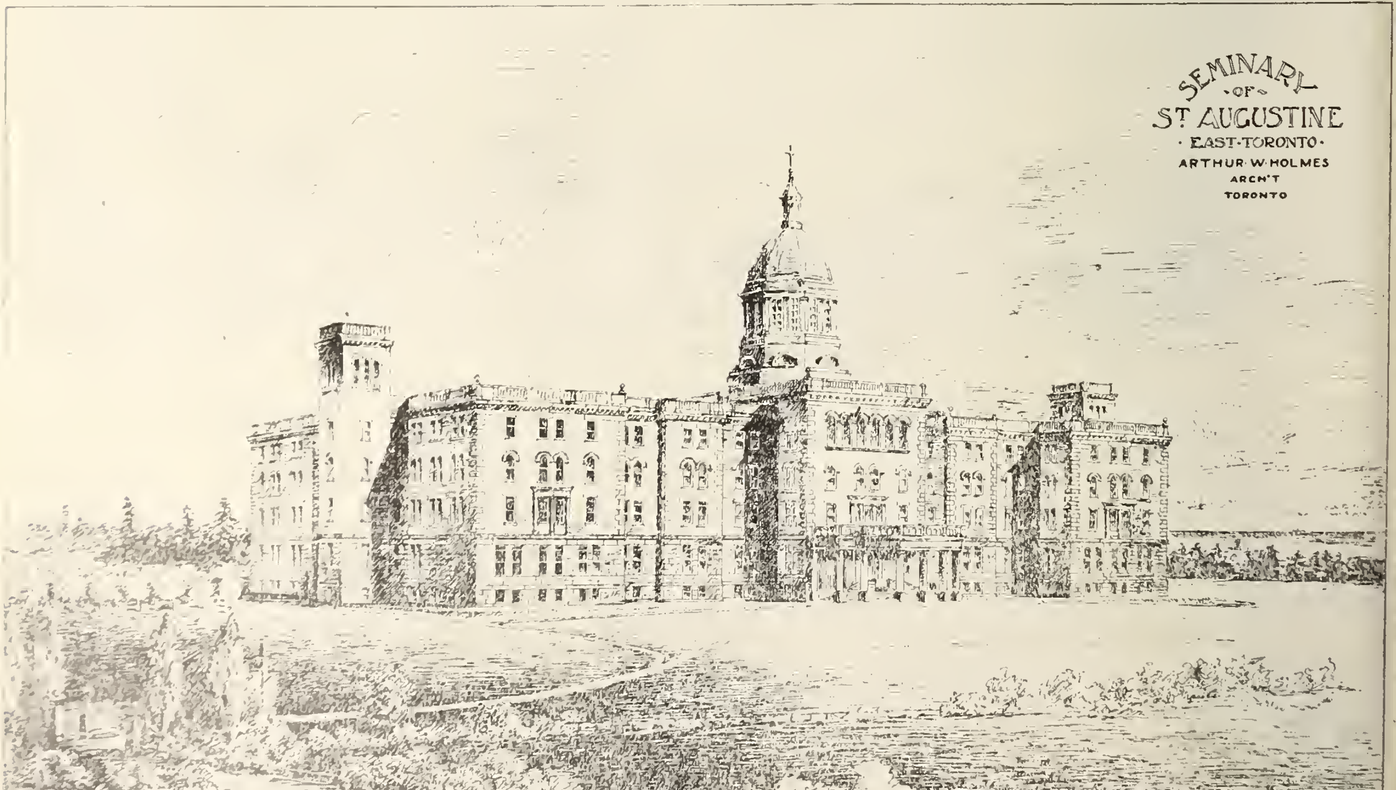


The Church of Our Lady of Lourdes, as extended. Architect, Mr. J. P. Hynes.

accepted recently for the Toronto Technical School. The successful architects were Messrs. Ross & MacFarlane, of Montreal. The plans were described in detail in as recent an issue of this journal as that of July 3, 1912.

The St. Augustine Seminary, which is now nearly completed, has been built at a cost of something like $400,000, according to the design of Mr. Arthur W. Holmes. This Roman Catholic institution, which will accommodate three hundred students, is located on the Kingston Road. The building is of fireproof construction throughout. The exterior is of brick with stone dressings.

The Church of Our Lady of Lourdes has recently



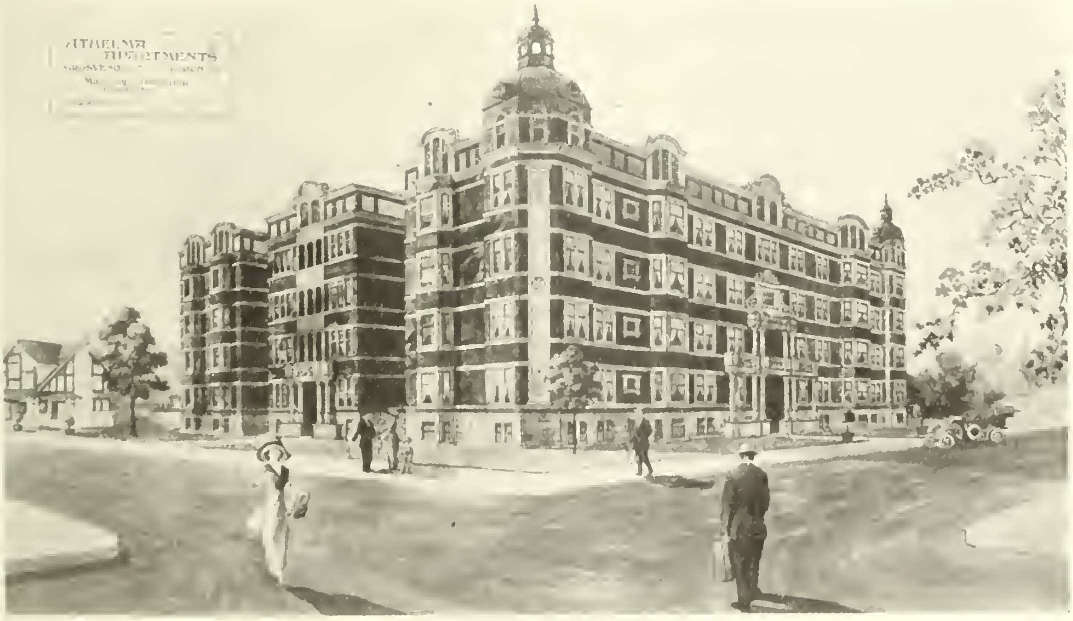
Seminary of St. Augustine, on the Kingston Road, now nearing completion. Architect, Mr. A. W. Holmes.

Interior view, Church of Our Lady of Lourdes.

Victoria College Library. Architects, Messrs. Sproatt & Rolph

been extended according to the plans of Mr. J. P. Hynes. The general architectural style of the building is inspired by the Italian Renaissance. The construction is of white brick with Indiana limestone trimmings.

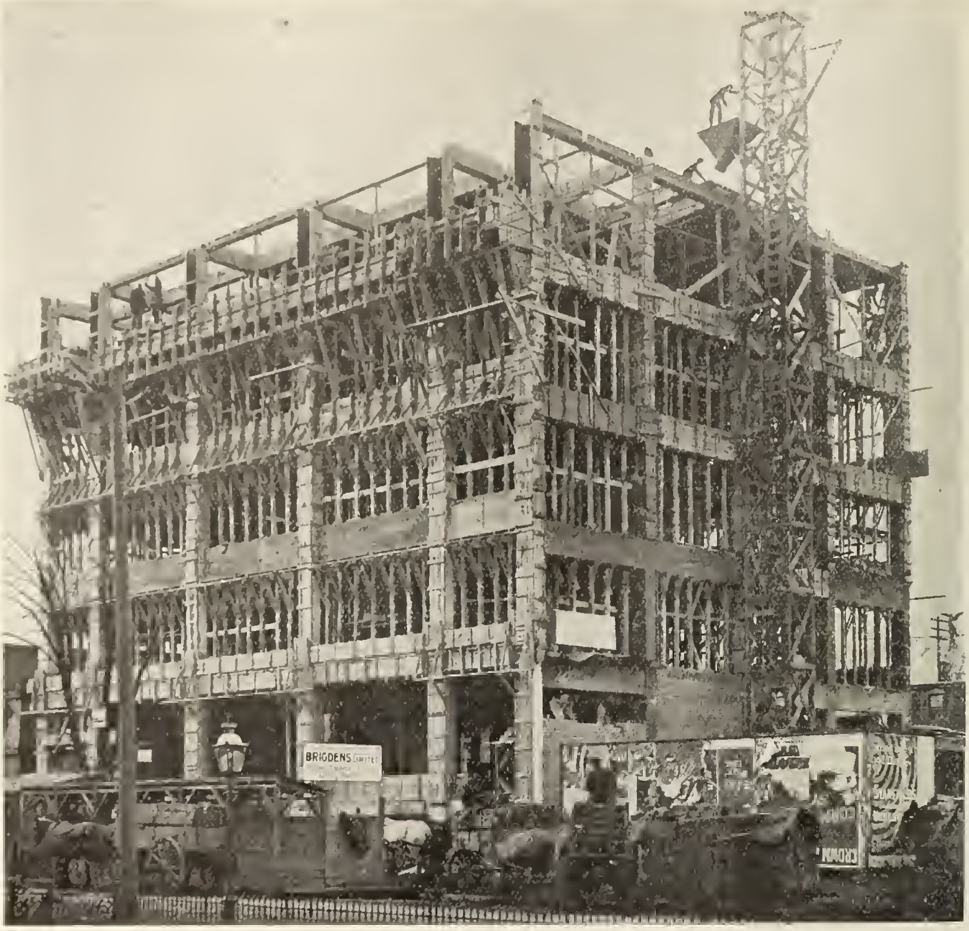
Of the commercial buildings, the new building erected for Messrs. Brigdens Limited, on Richmond street, is of more than passing interest. This building is of skeleton construction and is fireproof throughout, the structural work and floors being of reinforced concrete. In this building an effort has been made at improvement in the appearance of ordinary ce-



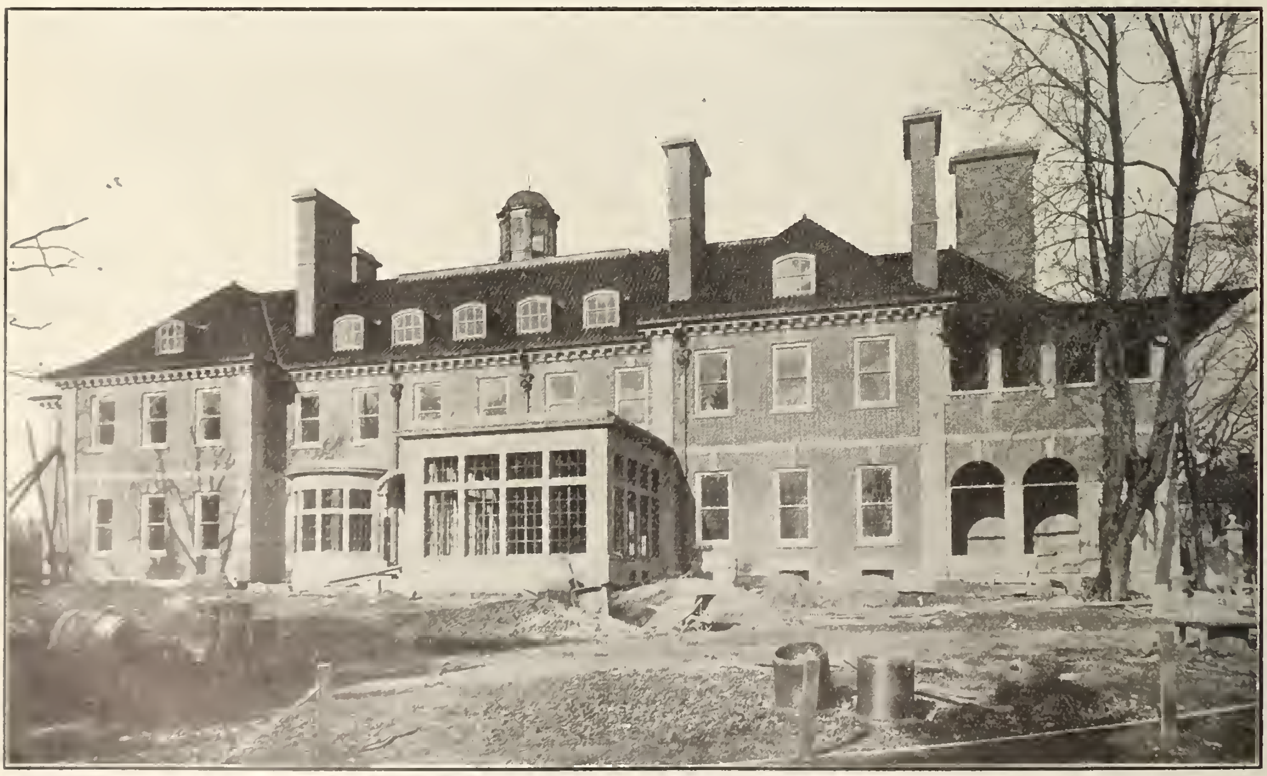
Athelma Apartments now under construction on Grosvenor Street. Estimated cost, $400,000. Architects, Messrs. Mallory & Thatcher.

Museum Building, University of Toronto, under construction.

Domestic Science Building, University of Toronto



The Brigden Building on Richmond Street, Toronto, under construction.
Architects, Messrs. Bond & Smith.



Residence of J. C. Eaton. Architects, Messrs. Wickson & Gregg.

ment concrete by having the outer inch of the work in the front composed of white portland cement and white silica sand. The spandrils between the windows are faced with white tapestry brick.

Of the other illustrations shown, Mr. J. C. Eaton's house, designed by Messrs. Wickson & Gregg, is typical of the best residential work and the Athelma Apartments, designed by Messrs. Mallory & Thatcher, of the best apartment house work.

The new Arena on Mutual street was designed by Messrs. Ross & MacFarlane, Montreal, and built by Messrs. Peter Lyall & Sons. The exterior of this building is of stone and local buff brick, while the interior is built of steel and concrete, the whole structure being practically fire-proof. Accommodation is provided for between seven and eight thousand people.

The last picture shown in this section is of the Hydro-Electric office on Yonge street, an attractive building faced with white Italian marble. The contractors and designers for this structure were the Deisenroth Contracting Company.

Sir Henry Pellatt's Residence, Toronto

SIR Henry Pellatt's residence, now in course of construction, is undoubtedly one of the most palatial in the country. The house, which is built on an altitude overlooking the city of Toronto, will have a frontage of 250 feet, with wings 100 feet deep. It will be built of Credit Valley stone and will cost in the neighborhood of one million dollars. The style of architecture of the residence is French Baronial, which is a combination of the Scotch Baronial and French Chateau, the climate of this country making this combination desirable.

At the rear of the house, stables have been built at a cost of $150,000, and an underground tunnel, 500 feet long, connects the house with the stables. This tunnel is built like a corridor and is lighted with electricity. All the heating plant for the house and stables is in the boiler room, which is adjacent to the stables.

The interior will be elaborately finished, every room having been designed in a different period. All kinds of selected hardwoods will be used for this purpose.

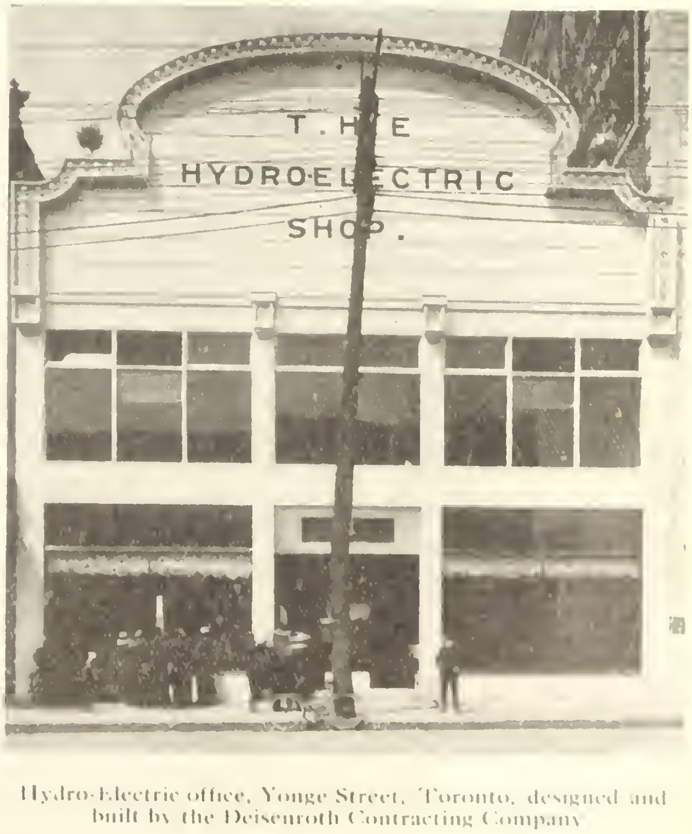
The house will contain about fifty apartments, including a great hall which extends two storeys in height; a large staircase hall adjoining; drawing rooms; library and reception rooms; servants' quarters and bedrooms. The bedrooms will be in suites of rooms, artistically finished with handsome woodwork and decoration. Each bedroom will have a separate bathroom attached. Mr. E. J. Lennox is the architect.

Toronto Stock Exchange Building

The new building for the Toronto Stock Exchange now being erected on Bay street is a structure of some interest which will be described in detail in a later issue of this journal. The architect for the building is Mr. J. M. Lyle, Toronto. The building will contain four storeys and a basement and will be 110 ft. 4 in. by 70 ft. in dimensions. The construction will be fireproof throughout, of steel and terra cotta. The floors are of hollow tile, all the walls being lined with the same material. Messrs. Holtby Bros., Limited, have the contract for the masonry and Messrs. G. Oakley & Son, Limited, the contract for the cut stone work. A glimpse of the operations now in progress may be obtained in the photograph of the Bank of Toronto reproduced on another page.

Mutual Street Arena. Architects, Messrs. Ross & MacFarlane, Montreal, and Mr. F. H. Herbert, Toronto.

The Randolph MacDonald Company, Limited, Toronto, have a number of important contracts involving an expenditure of nearly half a million dollars. The principal works upon which they are now engaged are the Hastings section No. 7 of the Trent Canal; the extension to the lower entrance piers lock No. 22, St. Lawrence Canal; and the dredging of the Murray Canal. The first-named of these works comprises locks, dam and dredging. The St. Lawrence Canal work consists of 1,200 feet of crib work, the erection of concrete superstructure and dredging. The Murray Canal work comprises the deepening of the entrances. The company's superintendent of construction is Mr. Arthur Stephen.



Hydro-Electric office, Yonge Street, Toronto, designed and built by the Deisenroth Contracting Company

New Head Offices of the Bank of Toronto

Exterior Work Completed and Good Progress Being Made on the Interior — Many Interesting Features — The Elaborate Equipment Described

PERHAPS the most impressive of Toronto's down-town structures is the new head office building of the Bank of Toronto at the corner of King and Bay streets. Excellent progress has been made on this work since the publication of our former article (Contract Record, April 10, 1912).

The general features of this building have already been described in this journal, and it is sufficient to say that the design is inspired by the Corinthian style and that the exterior is executed in Tennessee marble —noteworthy for its warmth of tone and refined carving.

The interior work is now proceeding steadily and as the building assumes a more definite shape the excellence of the design and the natural beauty of the materials become more and more striking.

The interior finish of the banking room will be of Botticino marble from floor to ceiling, including the mezzanine storey. The floor of the rotunda will be Hauteville marble and other marbles harmonizing therewith. The entire dome over the rotunda of the banking room will be of ornamental cast bronze, perforated and glazed with Cathedral glass. This dome, which is of very intricate construction, was manufactured by the Canada Foundry Company, Limited, and reflects great credit on them. It is interesting to note in this connection that this dome is the second of its kind built in America.

The carved marble work, both on the exterior and interior, has been executed by Messrs. Ardolino Bros. This marble work is one of the notable features of the building.

The special rooms, which include the assembly room, visitors' room, board room, president's room, vice-president's room and general manager's room, will be panelled with French walnut. The floors will be of teak.

The building will have a plunger elevator service, electric book lifts and dumb waiters. A pneumatic tube service will connect all the departments.

A complete power plant, on a rock foundation, will be built thirty feet below the sidewalk. The engine room proper, situated in the centre of the building, will be lined with white glazed tile and will have an observatory platform.

The first basement is arranged for storage vaults and a complete stationery department, which will supply all the branches of the bank. The department is supplied with a plunger elevator for merchandise.

The entire ground floor will be occupied by the Toronto branch. On the mezzanine floor will be the Cash and Securities Department (this being adjacent to the large vaults at the south end), and Assembly and Visitors' Room, Library and Correspondence Departments.

The first floor will be occupied by the President, General Manager, Assistant General Manager, and the general Head Office staff. The board room will also be on this floor.

The second floor, with the exception of the lunch rooms for the directors and the staff, has been leased to the architects for the building, Messrs. Carrere & Hastings, and Eustace G. Bird, who will occupy the premises shortly.

The beautiful sculptural work over the main entrance on King Street and also over the Bay street entrance was modelled by Mr. F. M. Tonetti, a French sculptor, and was carried out by Messrs. Ardolino Bros. under the direction of the architects. This work has been pronounced the finest of its kind on the continent.

The Contracting Firms

The following is a complete list of the contractors for this building:

Canadian Norcross Bros., Toronto, Canada—General contract, marble, interior and exterior, and interior finish.

Don Valley Brick Co., Toronto—Bricks.

Douglas-Milligan, Limited, Toronto—Kalameined doors.

G. H. Cronin & Company, Boston, Mass.—Rough plumbing, and Loumis-Manning filters.

National Fireproofing Co., Toronto—Terra cotta fireproofing.

Bennett & Wright, Toronto—Finished plumbing and heating.

John Inglis Co., Ltd., Toronto—Boilers.

Ardolino Bros., Toronto—Carving—exterior and interior.

Canada Foundry Company, Limited, Toronto—Structural steel and ornamental and structural bronze.

Lamson Company, Boston, Mass. —'Pneumatic tubes.

A. B. Ormsby, Limited, Toronto—Roofing and kalameined windows.

Tucker & Vinter, North Toronto—Floor and vault lights.

Norcross Bros.—Painting.

R. C. Dancy, Toronto—Lathing and plastering.

Gorham Company, New York — Architectural bronze and banking screens.

Freck-Clark & Company, Toronto—Screens.

A. Matthews, Limited, Toronto—Ventilation.

Hobbs Manufacturing Company, Toronto—Glass.

H. Hope & Sons, Toronto—Bronze and steel windows.

D. E. Kennedy, Montreal—Cork tile flooring.

Harry Alexander, Traders Bank, Toronto—Electric wiring.

Robb Engineering Company, Toronto—Engines.

Canadian General Electric Company—Dynamos.

York Safe Works, York, Pa.—Steel vaults.

Otis-Fensom, Toronto—Elevators.

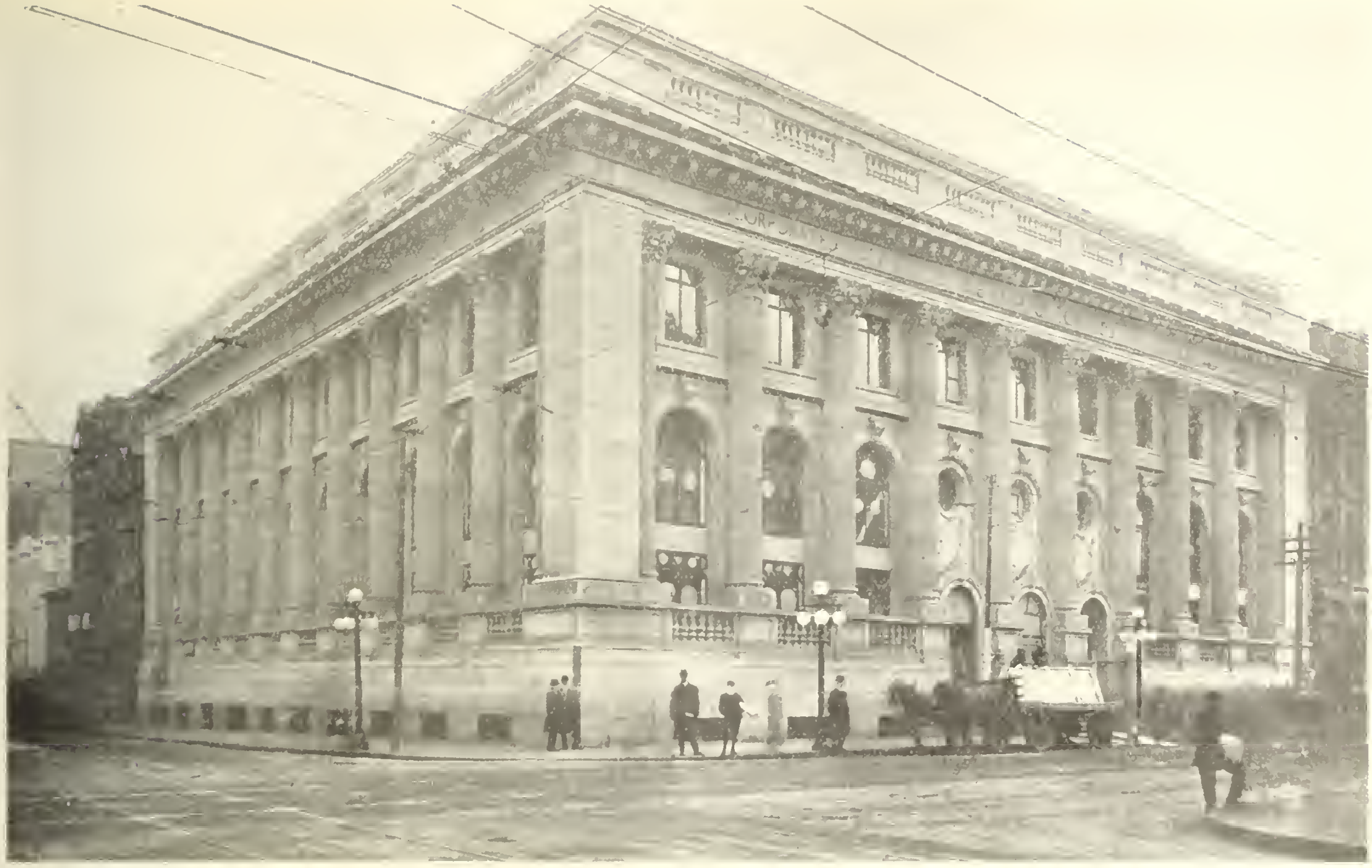
Murray-Kay—Electric fixtures.

Office Specialty Company, Toronto—Commercial furniture.

Murray-Kay, Toronto—Special furniture.

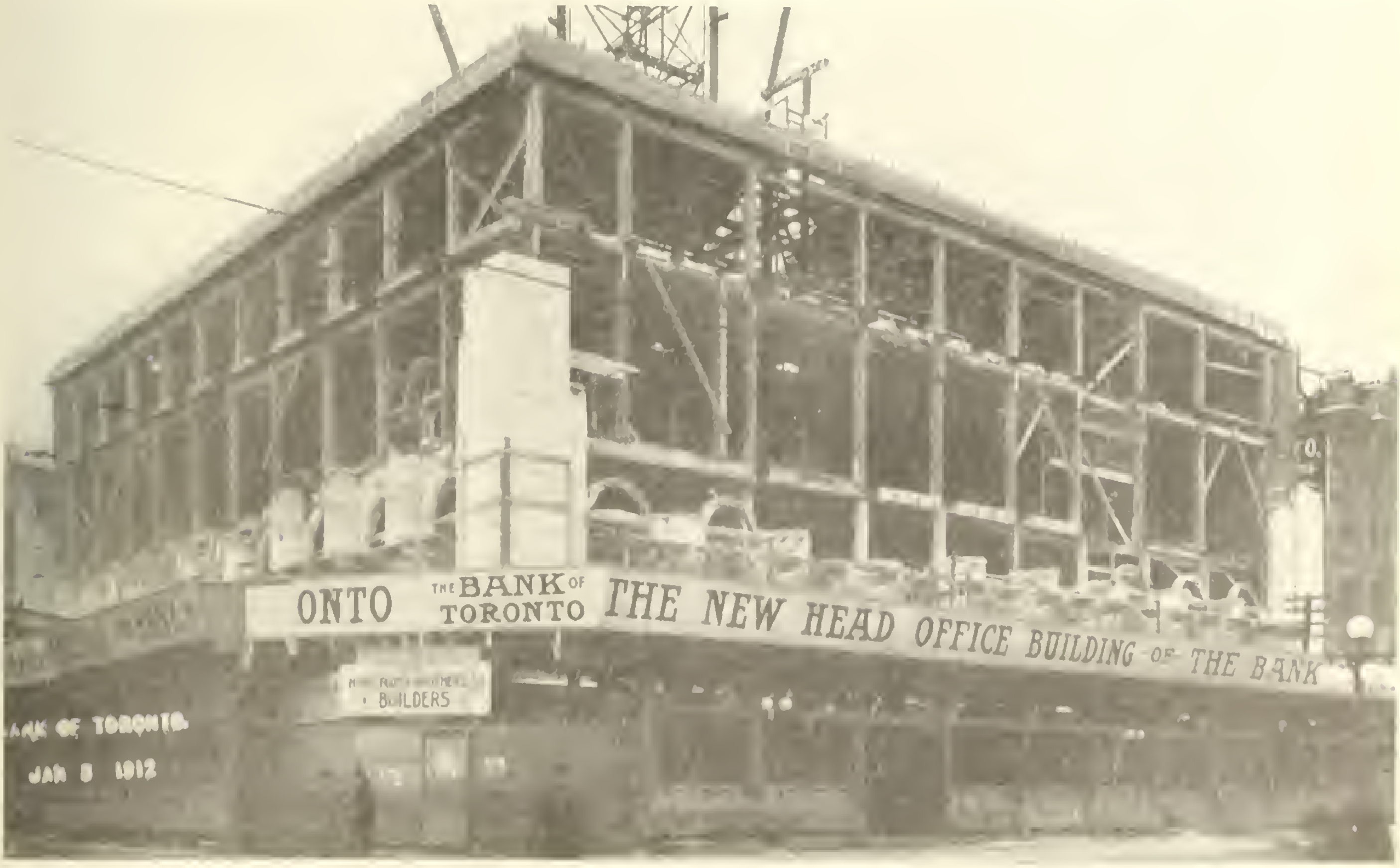
John McDonald, Toronto—Rugs.

Toronto Furnace Company and J. & J. Taylor, Incinerators.



NEW HEAD OFFICES OF THE BANK OF TORONTO

The architects for this building are Messrs. Carrere & Hastings, associated with Mr. Eustace G. Bird, of Toronto, and the contractors, Messrs. Norcross Bros. The progress made during the present year is shown by a comparison of the accompanying photographs, the upper one of which was taken on November 20, 1912, and the lower one on January 8, 1912.



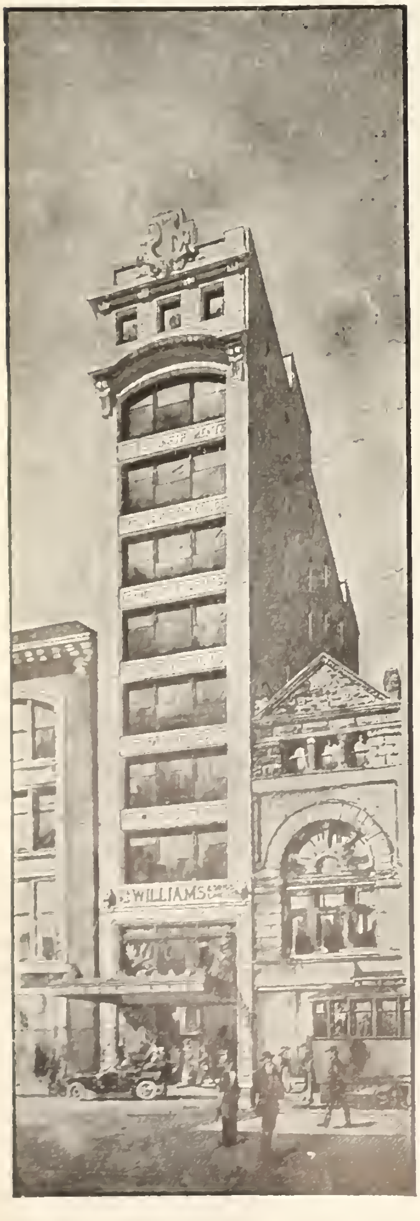
The New Williams Building, Toronto

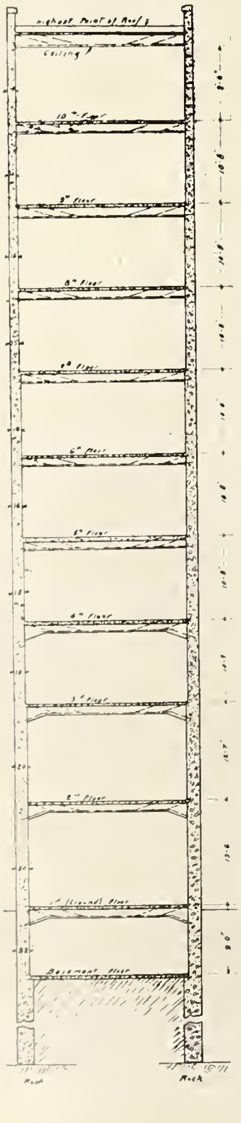
Reinforced Concrete Structure of Ten Storeys on Yonge Street—Interesting Features of Design and Construction

TORONTO is a city of but few reinforced concrete buildings, and of the few there are only two which reach a height of ten storeys. The most modern of these is the R. S. Williams building, on the east side of Yonge street, between Adelaide and Richmond streets, just now being completed.

This building has a frontage on Yonge street of twenty-three feet six inches and is one hundred feet deep. The street elevation is treated architecturally as one large panel with a glass front to each floor. The concrete on the front of the building up the sides is faced with glazed terra cotta.

On account of the narrow width of the lot and the City Building By-law limiting the height of a building to five times its width, it was necessary to keep the floor heights as low as possible. They were limited for most floors to 10 ft. 8 in., except for the two lower storeys which were made higher to correspond to the floor levels of an old building at the rear.





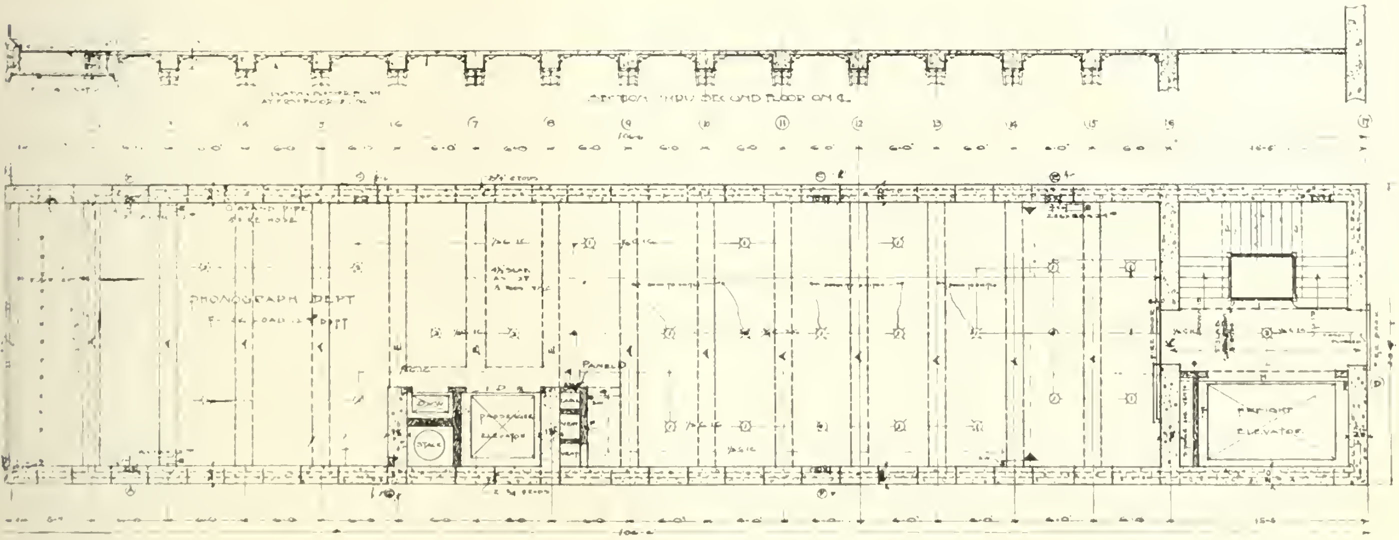
Perspective and Cross-Section of Williams Building

The walls and floors are both of reinforced concrete. The floor beams span clear across the building and are spaced at six foot centres. The floors were designed for a live load of one hundred and twenty-five pounds per square foot, the slab being four and one-half inches thick, reinforced with .28 square inches of steel per foot and the beams sixteen inches by sixteen inches reinforced with four 1½-in. rods, two of which extend the full length of the beam straight through in the bottom and two of which are bent up at the ends, to provide for shear.

It was desired, on account of its narrow width, to avoid any columns or pilasters in the sides of the building. The Toronto building by-law makes no provision for concrete walls, either plain or reinforced, and it has been customary in the building department to apply the regulations covering brick walls to concrete walls as well. This would have required the walls to be thirty-six inches thick in the basement, and thirty-two in the first and second floors. There are, however, no restrictions in the by-law in regard to the size or thickness of reinforced concrete columns or piers in skeleton construction. To comply with their technical interpretation of the by-law the building was designed as "skeleton construction," by considering three feet of the wall as column, and the next three feet as spandrel walls. Thus there is a column in each side wall for each beam. The reinforcing was concentrated in the columns instead of being uniformly distributed along the wall, and the walls between the columns were made the same thickness as the columns. This made it possible to have the thickness of the walls the same as required for skeleton construction, namely,—fourteen inches or more for the top seventy-five feet and eighteen inches or more for each additional sixty feet below. The actual thickness of the walls is as shown on the Section.

The building is designed to withstand a wind pressure of thirty pounds per square foot on the wall surface. It was assumed that the points of contraflexure in the wall occurred midway between the floors, and the beams were designed to resist the moment produced by the horizontal reactions at these points, the reaction being equal to the total wind pressure on the wall between the floor under consideration and the top of the building. For the lower floors the bending moment in each beam at the wall, due to the wind, was greater than at the centre from the live and dead loads. Knee braces were used under the ends of the beams on the first, second, third and fourth floors, and on all floors from the first to the seventh the ends of the rods were threaded and plates were used as washers. The splices in the column reinforcing were made about three feet above the floor level. At this height there was no tension in the concrete from the bending due to the wind. As the resultant pressure on the foundations, from the weight of the building and the wind pressure combined, would have exceeded that allowed by the building by-laws had a continous footing from side to side of the building been used, it was necessary to carry the footings to rock, about forty feet below the street level. A pier was carried down for each column. Generally the piers were two feet three inches by four feet six inches, rectangular in shape. This required the same amount of excavation and concrete as if the piers had been placed farther apart and avoided the necessity of cantilevering to bring the loads concentric with the piers. The only additional cost of this method was that of having to dig in a small hole. The hole was not inconveniently small for digging, and the amount added to the cost on this account must have been small.

The material excavated was a stiff blue clay free from water. It was hauled out of the holes in pails by a man at the top and wheeled in barrows through the old building to wagons in a lane at the rear. All material for the building had to be brought in from the lane in barrows, through the old building. The concrete for all the building above the first floor was mixed at the first floor and lifted in barrows up a hoist in the elevator shaft, from which it was distributed.



Typical floor plan Williams Building

The building was designed by Messrs. Chapman & McGiffin, architects, and erected by Messrs. Jago & Harris, general contractors. The reinforced concrete and footings were designed by Messrs. Harkness & Oxley, consulting engineers.

The Lieutenant-Governor's Residence at Chorley Park, Toronto

THE new residence now being erected at Chorley Park, Toronto, will be in every respect worthy of the official home of the Lieutenant-Governor of Ontario. The site is in one of the most beautiful suburbs of Toronto, and is within easy access of the city.

The main entrance to the residence is from east Roxborough street, which leads to a circular fore court and then over a stone bridge to the first court and main entrance. To support the fore court is a retaining wall on the east side, built of reinforced concrete, this wall being thirty-five feet high in places.

The house, which is in the French Chateau style of architecture, is faced with grey Credit Valley coursing with cut stone trimmings of grey sandstone. The total quantity of stone required is 35,000 cubic feet, and 1,500,000 bricks will be used for the interior walls and as a backing for the stonework.

The interior is fireproofed with porous terra cotta, consisting of cambered arching for the floors and terra cotta partition walls. The entire roof is covered with "book tiles," and all the beams and columns are protected with terra cotta.

The entrance hall and vestibule are 30 by 25 feet,

Lieutenant-Governor's Residence under construction the main hall 30 by 60 feet, and the ball room 44 by 60 feet.

There will be nineteen rooms in the basement and twenty-four on the first floor. Of these, the secretary's and waiting rooms, the Lieutenant-Governor's office, the state and private dining rooms, and the kitchen and rooms for the servants, will be on the west side. On the east side will be the reception room, drawing room, writing room, living room and palm room. The height of the rooms on the first floor will be sixteen feet from floor to ceiling, with the exception of the ball room, which will be 25 feet 6 inches from the floor to the eaves. The porte cochere will be of cut stone. There will be terrace bays to the living room on the east and to the state dining room on the west. The palm room will be of cut stone on three sides and will overlook the Don Valley on the east. On the east side of the ball room there will be an alcove, 32 by 12 feet, with a casement opening on to the verandah. The verandah will be made of cut stone with massive stone columns and monoliths, the columns weighing three tons each in one stone. The ball room has an apsidal end to the north. The billiard room will be on the second floor over the dining room and will face towards the west.

C. P. R. Head Office Building, Toronto

The second floor, with the exception of the billiard room, and the third floor, will contain twenty-four and twelve bedrooms respectively, and each bedroom will have a bathroom in connection.

The interior equipment has not yet been decided on and will not be until the construction is in a more advanced stage. The building is not expected to be ready for occupation for at least two years, although the masonry and structural steel work are well advanced and will be pushed on to completion.

The materials in this structure may be said to be stone, steel and concrete.

The contractors at present working on the building are:—Messrs. F. Holmes & Sons, cut stone, brickwork and fireproofing; Messrs. Douglas Bros., roofing; Messrs. Canada Foundry Company, Limited, steel; Messrs. Purdy, Mansell, Limited, plumbing.

The C. P. R. Head Office Building, Toronto

Easily the most noteworthy of Toronto's recent building acquisitions is the new C. P. R. head office building now nearing completion at the corner of King and Yonge streets. The building is fifteen storeys high with two mezzanine floors at the rear. The first storey is 26 feet high; the second, 14 feet; the third 13 feet, 3 inches, and the remainder, 12 feet, 3 inches, with the exception of the top floor, which is 18 feet high. A detailed description of this building will be given in our Annual Brick and Clay Products Number of December 18 next, but in general outline it may be said that the structure is of skeleton construction and rests on concrete caissons carried to rock. The walls are of brick, finished in terra cotta. The ground floor, including the counters, is to be entirely finished in marble. The floors throughout the rest of the building will be of concrete, with tiles in the halls and corridors. There will also be a marble dado 4 ft. 6 in. high in all the corridors. Steel casement sash are used throughout.

The ground floor will be devoted to the ticket office of the Canadian Pacific Railway, the first floor to the general offices and the two upper floors to the telegraph offices of the railway company. The remaining floors will be let off.

The building is equipped with every modern convenience, including hydraulic elevators and a vacuum cleaning system. There are two basements in the building, and the whole plant, which is in duplicate throughout, has been installed there. There are three boilers, the boiler room being 21 feet high, the height of the two basements. These boilers are equipped with all modern conveniences for handling coal and have an automatic carrier from the bunkers to the furnace. All the power needed will be generated in the building, so that it will be entirely independent of the city service. The towers in the roof are utilized for ventilating the two upper storeys, and air washers are in the ventilating system.

The architects are Messrs. Darling & Pearson, Toronto; the structural steel design is by Mr. A. H. Harkness, Toronto; the contractors are the Geo. A. Fuller Company, Limited, New York.

Toronto's Proposed Harbor Development

Summarized Statement of Great Undertaking Which Involves the Expenditure of Nearly Twenty Million Dollars — Reclamation and Bridge Work

ONE of the most important fields of engineering enterprise in the city of Toronto at the present time is in the sphere of harbor developments. Readers of the Contract Record and Engineering Review will already be familiar with the principal details of the important plan of the Toronto Harbor Commission outlined in our last issue. It was our intention to publish an account of the proposed undertaking in this issue but the plans materialized at an earlier date than was expected and so the project was featured with a number of plans in our issue of November 20. As announced editorially in our last issue, however, we are furnishing supplementary technical data herewith, by the courtesy of the Engineer to the Commission, Mr. E. L. Cousins.

In the Eastern Section (Industrial)nine hundred acres are to be reclaimed to eight feet about the mean water level. At present 90 per cent. of this property is under water. To fill up this ground 22,714,144 cubic yards of material will be necessary. This section is from the eastern entrance to Woodbine avenue and north of Fisherman Island and eastern sand bar. The park and lagoon portion of this eastern section south of the sand bar will reclaim 352 acres to the same height above the mean water level and will require 5,042,045 cubic yards. The central or island section, that is from Parliament street to Bathurst street, will reclaim 350 acres of park lands to an elevation of six feet above mean water level, and 4,267,600 cubic yards will be utilized for this purpose. The western section (Bathurst to Humber River) will require 3,942,649 cubic yards of material to reclaim 190 acres of park lands. These figures summarize to practically 1800 acres. Approximately 36,000,000 cubic yards of material will have to be provided for this purpose.

Against these 36,000,000 cubic yards required, there are approximately 50,000,000 available from the combined eastern, central, and western sections. Of this 50,000,000 cubic yards available, approximately 32,000,000 cubic yards can be procured from the lakes and 18,000,000 cubic yards from the Bay or Inner Harbor.

Four miles of retention piling and dock work, including ship channel, turning basin and marginal way on the bay face and north slip, constitutes part of the work on the eastern section. On the east section (park and boulevard) a breakwater and composite pile protection work will be erected which will be 23,950 feet long. Similar work on the western section will be 20,000 feet long and there will also be a retaining wall in front of the Exhibition Grounds, 3,500 feet long, a retaining wall from Sunnyside to the Humber, 6,880 feet long, and an exhibition dock, 300 feet long.

The structures which are suggested for the eastern and western entrance bridges are to be of the Scherzer roller lift or Strauss Bascule type, 60 ft. wide, providing for street railway, vehicular and pedestrian loading. A similar type of bridge is contemplated for the crossing of the ship channel except that this bridge will provide for the steam railway, street railway, vehicular and pedestrian traffic and will be 60 feet wide. One bridge over the Don River diverted is to be 80 feet wide, and 120 feet long.

In the eastern section on the boulevard drive there will be seven vehicular bridges with a 40-ft. span and 80 feet wide, two vehicular bridges, each with 100-ft. span, one 80 feet and the other 56 feet wide, one with a 40-ft. span and a width of 56 feet. Seven foot bridges will be erected with a 50-ft. span for crossing lagoons. These bridges will be of arch construction ten feet wide, the headroom varying from 8 to 10 feet at mean water level.

Over the central section there will be ten 50-ft. pedestrian bridges and three 120-ft. bridges, all of these being of the arch type, and 10 feet wide. There will also be three bridges each 180 feet over all, consisting of two 50-ft. and one 80-ft. arch spans. These will provide for street railway, vehicular and pedestrian loading. There will also be one 100-ft. arch span for the same purpose. In this section there will also be four 40-ft. spans for the boulevard drive over the lagoons, providing for from 8 to 10 feet headroom at mean water level.

In the western section there will be one 400-ft. concrete arch pedestrian bridge connecting the mainland with the proposed exhibition dock. This bridge will be 10 ft. wide with 30-ft. arch spans.

A trackless trolley system, which is said to be the first to be established in Scotland, has recently been placed in operation in Dundee. It is similar in general to other installations which have lately been made in several parts of Great Britain. The cars travel on the highway with a considerable lateral range of motion and obtain their power from overhead wires through two trolley poles, one of them and one wire acting as a return for the current. The cars weigh 3½ tons and accommodate 28 passengers. Two cars are now in operation on the Dundee line. The cost of the installation per mile is said to be about one-tenth that of an ordinary electric railway system. The principal use of the lines is contemplated to be as feeders to the regular city lines of public conveyance.

Condensation of moisture on the surface is what takes the polish off of tools and makes iron rust. Preventing it is simply a matter of keeping the surface coated with some varnish, resinous or oily substance. If tools are carefully cleaned every night and then gone over with an oily rag, they should keep in very good shape; that is, if they are in use every day so that this oily coating has a frequent renewing. A heavier coating for tools that are to be put away for some time, and one that can be cleaned off readily, can be made by melting together 7 parts of tallow and 1 of resin, stirring the same till it cooks. Apply in a half liquid state, thinning to the right consistency with either benzine, gasoline or coal oil.

Two million dollars will be spent by the King Edward Hotel Company, Toronto, in adding two storeys to their present structure. When this work is completed, the hotel will have 1000 rooms

The Department of Works at Toronto

Commissioner Harris and the Men Associated with Him in the Engineering Administration of the Queen City

Mr. R. C. Harris Commissioner of Works

Mr. Roland Caldwell Harris, Commissioner of Works for the city of Toronto, has had a varied experience in civic work, having at different times been connected with the offices of the City Solicitor, Mayor and City Clerk, and also with the Parks, Property, Street Cleaning and Works Departments.

In 1905 he became Property Commissioner, and in 1910 he also assumed control of the Street Cleaning Department. In 1912 he was appointed City Engineer and Commissioner of Works, retaining charge of the Street Cleaning Department.

Mr. Harris was largely responsible for the establishment of the city industrial farm on Yonge street north, and has been greatly interested in humanitarian work. He is still a comparatively young man, being only thirty-seven years of age.

Mr. Harris was preceded as City Engineer by Mr. Chas. H. Rust, now City Engineer of Victoria, who held the office from 1898 until the spring of the present year. The history of the position prior to 1898 as far as the holders of the office and the length of their tenure is concerned is as follows: Mr. E. H. Keating, 1892-98; Mr. Granville C. Cunningham, 1891-92; Mr. W. T. Jennings, 1890-91; Mr. Chas. Sproatt, 1883-89; Mr. R. J. Brough, 1880-83; Mr. Frank Shanly, 1875-80; Mr. Chas. W. Johnston, 1871-75; Mr. J. H. Bennett, 1861-70; Mr. Alfred Brunel, 1859-60; Mr. Thos. Booth, 1857-58; Mr. Thos. H. Harrison, 1856; Mr. Wm. Kingsford, 1885; Mr. John G. Howard, 1854; Mr. Wm. Thomas, 1853; Mr. John G. Howard, 1843-52; Mr. Thomas Young, 1840-42.

Mr. G. G. Powell—Principal Assistant Engineer

Mr. G. G. Powell, Principal Assistant Engineer to the Department of Works, Toronto, is a graduate of the School of Practical Science in Civil Engineering of the class of 1902. In 1903 he took a post-graduate course and obtained the degree of B. A. Sc. After graduation he was employed with the Canada Niagara Power Company, at Niagara Falls and on inspection work in Cincinnati and Milwaukee. In 1905 he became identified with the Constructing and Paving Company of Toronto, as Assistant Engineer to the General Manager. The following year he was appointed Assistant Engineer in charge of day labor work of the Roadway Department and in 1907 Assistant Engineer in charge of construction work. He attained his present position of Principal Assistant Engineer in 1909.

Mr. James Milne Mechanical and Electrical Engineer

Mr. James Milne, Mechanical and Electrical Engineer to the Department of Works for the city of Toronto, was born at Aberdeen, Scotland, in 1865. He received his technical education at Robert Gordon's University, in which he served his apprenticeship as a mechanical engineer with Messrs. Davidson & Sons, of Aberdeen. Mr. Milne came to Canada in 1887 and was associated with the Edison Company as engineer for four years, at the end of which period he secured the appointment of general superintendent of the Electric Light Company, Toronto, in which capacity he remained for seven years. Mr. Milne's next post was that of general manager and chief engineer of the General Engineering Company. After serving six years in this capacity he left Toronto to join the B. C. Electric Company as general superintendent. From 1910 to 1912 he was general superintendent of the Canadian Salt Company, of Windsor. He was appointed to his present position at Toronto last August.

Mr. Milne has thus had a varied and valuable experience extending over twenty-five years. It will be within the recollection of not a few that from 1894 to 1896 he taught the subjects of steam engineering, applied mechanics and machine construction at the Toronto Technical School.

Mr. A. B. Garrow—Assistant Engineer in Charge of Main Drainage Works

Mr. A. B. Garrow was born at Goderich in 1886 and was educated at Goderich and at Upper Canada College. He entered the class of '07 Science at the University of Toronto and took an honor degree of B. A. Sc. in 1908. For two years he was assistant to the Engineer-in-Charge at the harbor works and elevator for the C. P. R. at Port McNicol. He entered the employ of the city in December, 1909, as draughtsman in the Main Drainage Works branch of the Works Department and assumed charge of the branch in 1911.

Mr. W. R. Worthington — Assistant Engineer in Charge of Sewers

Mr. Wm. R. Worthington, whose appointment to his present office dates back only from the first of this month, is a native of Toronto and a graduate of the Faculty of Applied Science of the University of Toronto (Class '04). As acting chief sewer engineer for several years, he had charge of the design and construction of some of the largest sewer systems in the Dominion.

Mr. M. A. Stewart—Assistant Engineer in Charge of Roadways

Mr. M. A. Stewart, Assistant Engineer to the Department of Works, Toronto, in charge of the Roadways Division, was employed in various capacities in the City Engineer's Department at intervals from 1901 to 1909, and succeeded to his present office in the latter year. He graduated from the School of Practical Science in 1905.

The area of the city of Toronto, not including the portion of land covered by water, is twenty-eight square miles.

Over two hundred freight trains and some one hundred and thirty passenger trains enter and leave the city of Toronto daily.

Mr. G. G. Powell

Mr. A. B. Garrow

Mr. R. C. Harris

Works Department
City of Toronto

Mr. R. C. Harris,
Works Commissioner

Mr. C. L. Fellowes,
Deputy City Engineer

Mr. G. G. Powell,
Principal Assistant Engineer

Mr. James Milne,
Electrical and Mechanical Engineer

His Worship Mayor Hocken

Works Department
City of Toronto

Mr. A. B. Garrow,
Assistant Engineer, Main Drainage Works

Mr. M. A. Stewart,
Assistant Engineer, Roadways Branch

Mr. C. W. Power,
Assistant Engineer, Railways and Bridges

Mr. W. R. Worthington,
Assistant Engineer, Sewers Department

Mr. M. A. Stewart

Mr W. R Worthington

Mr. James Milne

The Sewer System of the City of Toronto

Combined System with the Exception of Kew Beach—Details of Important Works Projected and Under Way

THE history of all great cities bears out the fact that the growth and development of a city are contingent upon its natural advantages, and Toronto is by no means an exception, as her admirable location is directly responsible for the abnormal growth. The city of Toronto is situated on the north shore of Lake Ontario, one of the largest bodies of fresh water in the world, and gradually attains an elevation of 240 feet above the lake at a point about four miles north.

The sewer system of Toronto is a combined one, with the exception of one district known as Kew Beach. This district, which is bounded by Woodbine Avenue, Leuty Avenue, the Lake and a point a few hundred feet north of Queen Street, has what is known as a separate system, the sewage being treated in a Cameron Septic Tank together with contact beds.

The working capacity of Toronto is overshadowed by its rapid growth, the consequence of which is that many of the recent annexations are still without sewer accommodation. This year, the Department has completed the system of sewers for Wychwood District and is rapidly completing the Oakwood and Earlscourt sewage systems.

In the early part of the year a sewer scheme was designed and recommended as a local improvement for East Toronto. The estimated cost of this system is $1,300,000. Some of the outlets are now under construction. In designing this scheme, many difficulties were encountered, due to the peculiar land formation. The sewage from the northern portion of this district will have to be syphoned into the new sewage disposal works at the foot of Morley Avenue, while the easterly section will necessitate pumping. One of the detail sheets reproduced herewith (Fig. 1) gives an idea of the unique design that had to be resorted to in order to make it possible to convey the sewage along Queen Street to the tanks from the eastern portion of East Toronto. The situation was so peculiar that three sewers were required on that portion of Queen Street from Woodbine Avenue to Kenilworth Avenue. The pinch came when it was discovered that there was only seven feet of room available between the street railway tracks and a water main for the construction of the three sewers, the rest of the street being alive with underground obstructions. The culvert shaped section is a storm sewer emptying eastward into Kenilworth Avenue storm sewer, and the 12-inch tile pipe is a sanitary sewer which also flows eastward to Kenilworth Avenue sanitary sewer. This was constructed in the south wall of the storm sewer and intercepted the private drains which originally emptied in to the sanitary sewer on the north side of Queen Street. The 18-inch tile pipe is the outlet for the dry weather flow

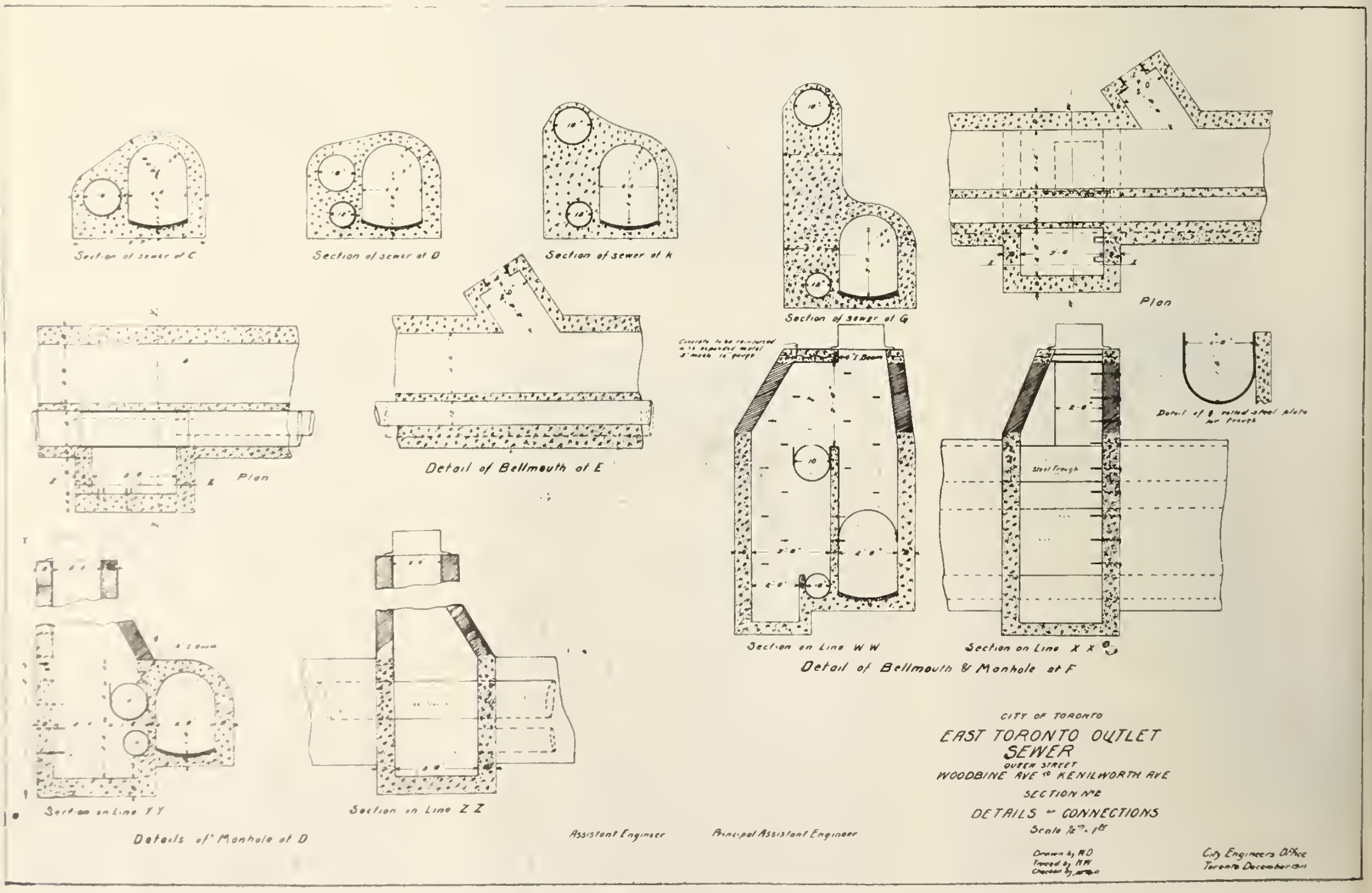


Fig. 1—East Toronto outlet sewer—Details of Connections

from East Toronto and the flow is in the opposite direction to that of the other two. At one end the pipe is built on the extension of the south wall of the concrete culvert while at the other end it is built in the south wall of the culvert. The construction of this work proved very interesting.

A sewer system is being designed for the Midway District which lies between Greenwood Avenue and East Toronto and it is hoped to have the recommendation for the construction of this system before the Committee on Works by the end of this month. The approximate cost of this system will be $1,000,000.

In the year 1909, West Toronto was annexed to Toronto and with it the Department inherited a botched up sewer system which will have to be practically reconstructed. The design for a complete sewage scheme is finished and the recommendation will be placed before this year's Council. The proposed system is a combined one; the sewage and storm water will all be delivered to the corner of Keele Street and Bloor Street. At this place the dry weather flow will be separated from the storm water and the sewage conveyed down Keele Street to the corner of King Street and Roncesvalles Avenue, where it will be intercepted by the trunk sewer, while the storm water will be carried down through High Park to the lake. In order to avoid the tremendous expense of constructing a very large storm sewer down through High Park it was deemed advisable to construct a storage tank in the Park at Bloor Street. The proposed storage tank is 300 feet square and 10 feet deep and will hold seven minutes' flow raining at the rate of 4.8 in. an hour. At the outfall end of this tank there will be a series of rough filters which will render the effluent in good condition for chlorination if the Provincial Board of Health demands it. The final effluent will be conveyed to the lake in a comparatively small sewer and an attendant can regulate the flow by means of a few gate valves. This scheme will cost about one-third of the amount required to convey the storm water to the lake in a large sewer. It is intended to cover over the tanks to protect them from climatic conditions, and at the same time the roof will afford an excellent recreation grounds for bowling or tennis.

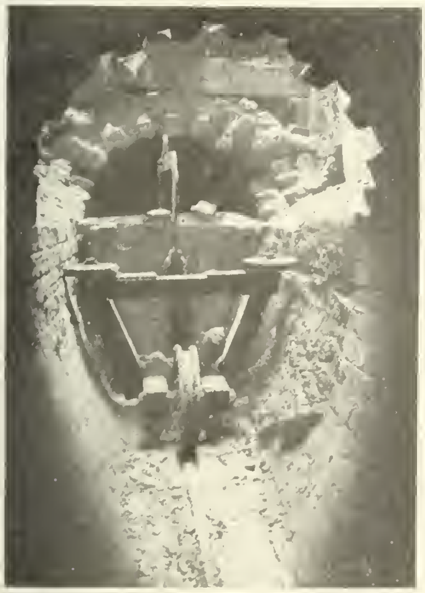


Fig 2—Mono-rail bucket in egg-shaped sewer

The outlet for the above section was commenced in the latter part of 1911 and is now ready to receive the dry weather flow from the general system. The contract for this work was split up into four sections. Section No. 1, from Queen and Roncesvalles, up Roncesvalles to Marion Street, was constructed in tunnel by the city. The cross section was a 2 ft. 10 in. x 4 ft. 3 in., egg shaped. Fig. 2 shows the type of mono-rail bucket equipment used during construction. Section 2 and 3 were constructed in open cut but No. 4 is being constructed in tunnel. This section has a depth of 65 ft. and nothing but a fine sand is being encountered. The tunnelling is being done by what is called the cap and leg method—the caps and legs are 12 in. x 12 in. timbers and the driving lumber is 3 in. x 6 in. oak about 8 ft. long. Fig. 3 is a photo of the men in the act of driving. The operation of carrying on this work is very interesting, and to give one an idea of the enormous weight that is being exerted on the timbers, some of the caps at four foot centres bend and crack.

Toronto is at present suffering from a very bad attack of what might be called "growing pains," for which the only cure is a large expenditure of money. The sewer system in 1903 had a total mileage of 238 miles, and even at this early period the outlets showed signs of the inefficiency of capacity, but still the indiscriminate sewer extensions were made until the total mileage reached 350 miles in 1911. As a result the floodings became so serious in the older or business section of the city that Council was forced to take some definite action to relieve the overtaxed sewer system. In 1911 the people authorized the expenditure of $800,000 for a system of relief sewers, but since the above estimate was prepared the city has

Fig. 3—Driving head timbers in Bloor Street tunnel

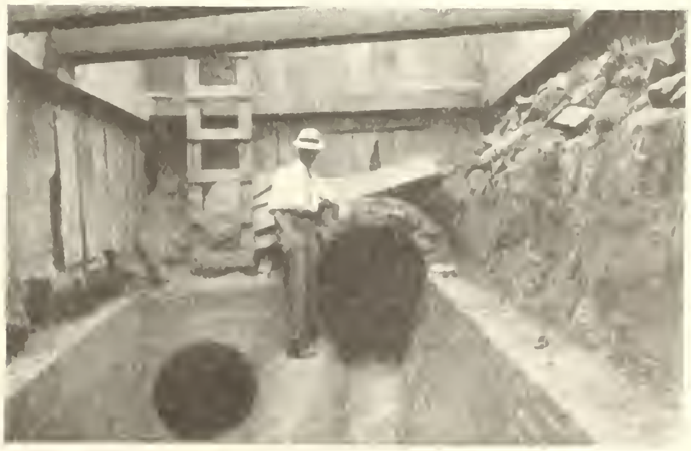


Fig. 4—Typical method of separating storm water, Jarvis St. weir

annexed thousands of acres. The sewer system of many of these annexations will have outlets into the present sewer system which will also have to be relieved. To cope with this serious condition a most complete system of relief was designed without regard to the $800,000 at the disposal of the Department, and it is intended to construct as much of the system as possible with this amount and then ask for a further appropriation to complete the work. In designing this system of S. O. S. the Department ignored all formulae used to find the discharge and substituted a method which dealt with impervious areas and the maximum rainfall. Survey parties were sent out to typical sections of the city to ascertain the percentage of impervious areas. These areas ran from .20 per cent. in residential sections to 80 per cent. in the manufacturing centres. This information was referred to in dividing the city up into certain areas and assigning the percentage of impervious areas to each section which would form the future bases of calculations for discharge.

The portion of the city bounded by Ashbridge Bay, north city limits, Don River and Leslie Street, will eventually be relieved by the following Storm Overflow Sewers:—Carlaw Avenue S. O. S., comprising four sections, viz.:—No. 1 on Carlaw Avenue, from the Bay to Gerrard Street; No. 2 on Gerrard Street, from Carlaw Avenue to Jones Avenue; No. 3, on Gerrard Street, from Carlaw Avenue to Logan Avenue, and No. 4 on Queen Street, from Carlaw Avenue to Pape Avenue; Dagmar Avenue, from Jones Avenue to Marjory Avenue; Broadview Avenue relief sewer, from Broadview Avenue opposite Langley Avenue to the Don River, and lastly Danforth Avenue, from the Don River to Pape Avenue. Of the above, Broadview Avenue and Dagmar Avenue S. O. S. are completed and Carlaw Avenue No. 1 is nearing completion. Together with these it is expected to be able to construct No. 4 out of the present appropriation, but the construction of Danforth Avenue S. O. S. and Carlaw Avenue No. 1 and No. 2 will have to stand over until a further storm sewer appropriation is granted. In designing the lower portion of Carlaw Avenue storm sewer, great difficulty was experienced, as Carlaw Avenue between the Bay and Eastern Avenue is extremely flat and afforded very little head room under the pavement for the construction of a relie sewer. In order to overcome this difficulty a twin culvert shaped sewer, each section being 3 ft. 7¾ in x 5 ft. 3½ in., was designed in concrete with a reinforced top which would eventually be the concrete foundation for the asphalt pavement.

The Storm Overflow Sewer known as Wilton Avenue S. O. S., was designed to relieve the business section of the city between the Don River and University Avenue from Bay to Bloor Street. The route of this sewer is from the Don and Cornwall Street, along Cornwall Street to River Street, down River Street to Wilton Avenue, along Wilton Avenue to Mutua Street, up Mutual Street to Gould Street and thence along Gould Street to Yonge Street. The principle of the relief is the interception of the greater portion of the storm water from the sewers on the intersecting streets. It is the policy of the Department to carry on the sewer construction in tunnel where the nature of the ground and size of the sewer makes it most economical and the conditions surrounding Wilton Avenue S. O. S. made it an excellent tunnelling proposition. The Godson Contracting Company commenced work in the latter part of 1911 and carried on

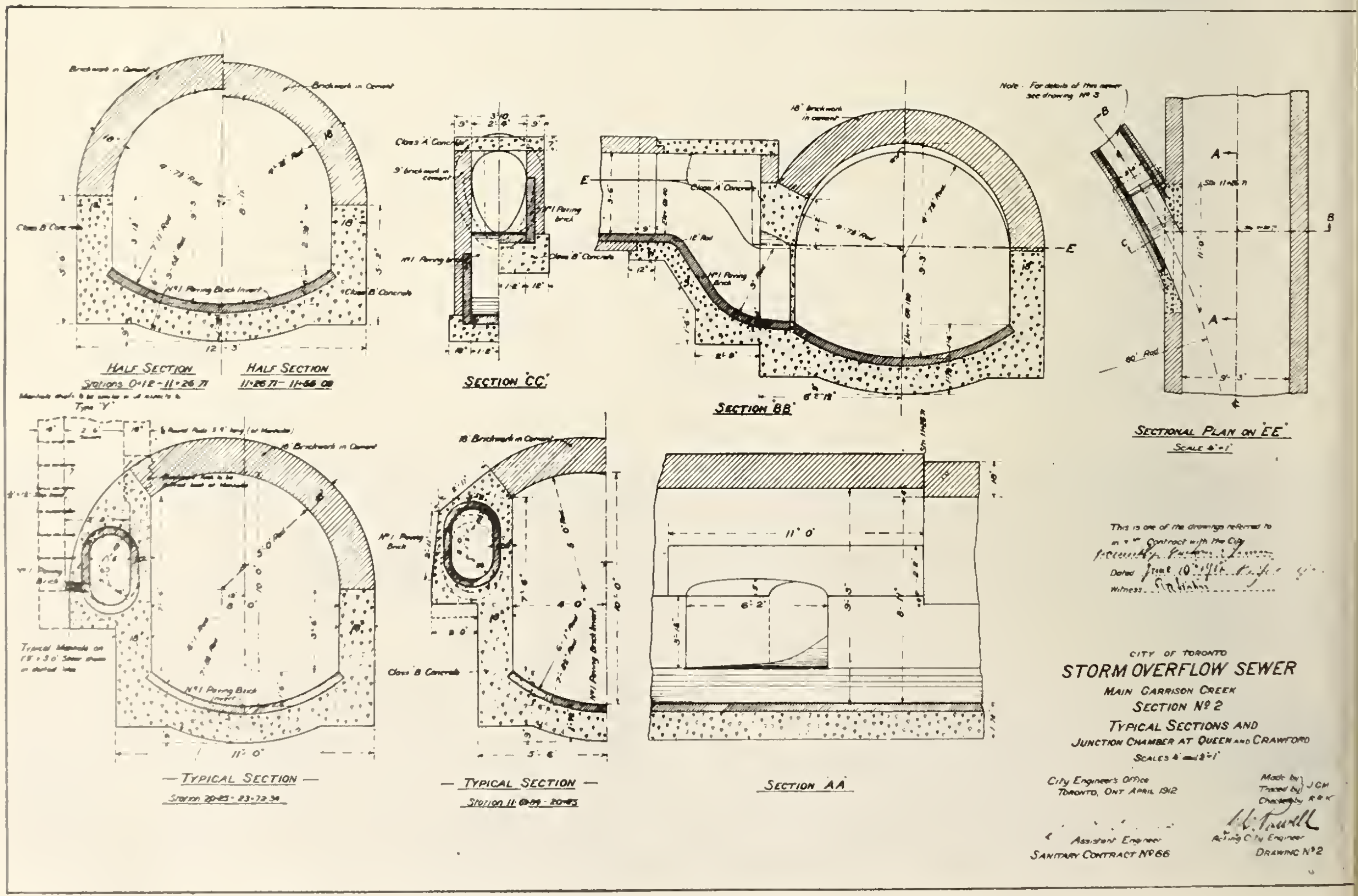


Fig. 5—Detail of section of main Garrison Creek storm overflow sewer

work continuously without interruption to traffic. This sewer is completed with the exception of a few finishing touches. It was constructed entirely of concrete mixed in the proportions of 1, 3 and 5 with the exception of a 1½-in. facing mixture (1:1:3) for the invert. Fig. 4 is a photo of Jarvis Street overflow chamber and shows the weir over which the storm water flows into the circular sewer that leads to the storm sewer.

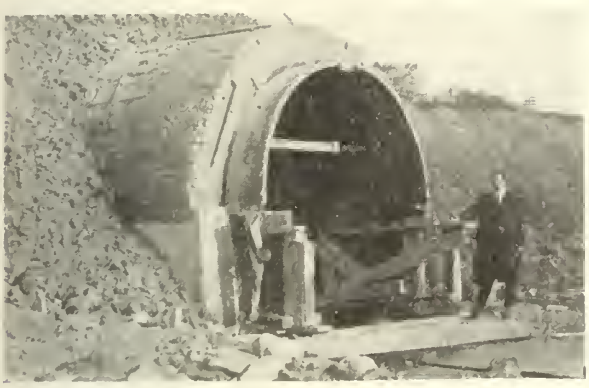


Fig. 6—Outlet, Garrison Creek storm sewer

The following system of S. O. S. was designed to relieve the congested district bounded by University Avenue and the C. P. R. between the Bay and the north city limits. The main outlet for this system is the Garrison Creek S. O. S., which commences at the foot of Strachan Avenue and comes up Strachan Avenue to Defoe Street, along Defoe Street to Crawford Street, up Crawford Street to Lobb Street, along Lobb Street to Shaw Street and up Shaw Street to Arthur Street, thence northwest through a park at the corner of Roxton Road and Harrison Street. Here it intercepts the N.W. Branch of the old Garrison Creek Sewer and from this point northward to Bloor Street it parallels the existing Garrison Creek which terminates at Bloor Street, just west of Christie Street. This main Garrison Creek Storm Sewer, as it is called, will intercept all the sewers running east and west, but apart from this some new lateral sewers on east and west streets had to be designed in order to relieve many of the north and south sewers which are far remote from the main Garrison Creek Storm Sewer. The first of these laterals is the one along Queen Street to Bellwoods Avenue, up Bellwoods Avenue to Robinson Street and along Robinson Street to Bathurst Street. The second is called the Argyle Street Storm Sewer, which commences at Shaw Street and Argyle Street, thence along Argyle Street to Gladstone Avenue, up Gladstone Avenue to Trafalgar Avenue, to Brock Avenue, up Brock Avenue to College Street, along College Street to Lansdowne Avenue, up Lansdowne Avenue to Lumbervale Avenue, and along Lumbervale Avenue to St. Helen's Avenue. College Street S. O. S. is the third lateral and extends along College Street from Rusholme Road to Brunswick Avenue. Up to the present time, there has been an open sewer up through Willowvale Park, which is really the northern part of the original Garrison Creek. In order to do away with this unsanitary condition, the Department has under construction a very large sewer through the Park. This sewer when complete will eventually empty into the other Main Garrison Creek sewers and will also form an outlet for the 4th and 5th lateral S. O. S. The largest of these is the Barton Avenue relief sewer, which runs eastward from Willowvale Park along Barton avenue to Avenue Road, and will intercept all the congested sewers emptying into Bloor Street sewer. Apart from these, there are a few other smaller ones which are not worth mentioning but which make the system most complete.

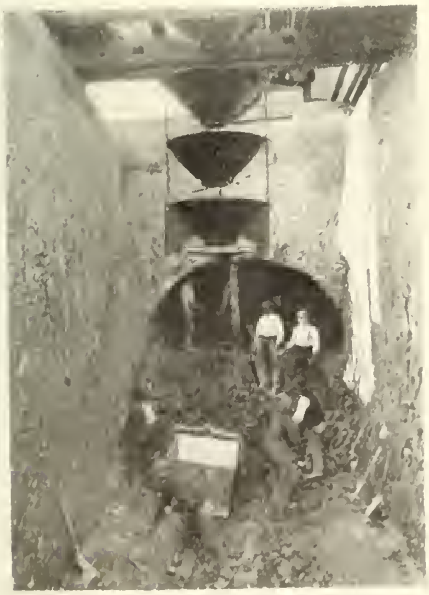


Fig. 7—Open cut section of Garrison Creek storm sewer

Out of the present appropriation of $800,000, the Department expects to complete the construction of the Main Garrison Creek Storm Sewer from the Lake to the corner of Roxton Road and Harrison Street, and all of Barton Avenue. The remaining ones will have to be taken care of by a special appropriation.

The lower portion of the Garrison Creek S. O. S. is probably the largest sewer in Canada at the present time. The cross section is culvert shaped, designed for concrete, with a No. 1 paving brick invert. The advantages of a brick invert are many, but the outstanding one is that repairs can be made very readily to any worn-out section.

The remaining illustrations may be described briefly. Fig. 5 gives a detail of the section of the Main Garrison Creek S.O.S., showing an ingenious method of constructing a dry weather flow sewer in conjunction with the S.O.S. Fig. 6 is a photo of the Main Garrison Creek S.O.S. Outlet, and Fig. 7 shows a view of the open cut of the same sewer.

A twelve-storey hotel, containing six hundred rooms, with baths, is shortly to be erected at the corner of King and Bay streets, Toronto. The total cost of this hotel will be $6,000,000, half of this amount being for the building and the remainder for the land.

The value of the property and other assets possessed by the city of Toronto is estimated at $20,000,000. This valuation is exclusive of all public works and services of the city. The estimated revenue from the waterworks this year is close upon one million dollars.

A fine example of concrete bridge construction on a large scale has been completed at Spokane, Washington. The bridge is 784 feet long by 68 feet wide and includes three arches, of which the middle one has the span of 281 feet, and the clear height of 130 feet above the water.

The Department of Railways and Bridges

Grade Separation at Parkdale—Interesting Work on Civic Car Lines—Constructional Methods Described and Illustrated

THE Department of Railways and Bridges has charge of construction and the maintenance of all bridges within the municipality; the construction and operation of civic car lines; the protection or separation of street and railway crossings; and all engineering matters pertaining to railways within the city.

GRADE SEPARATION

G. T. R. Part 1 A. Toronto Grade Separation.—This comprises the heading under which the accounts for the construction of grades at the highway crossings on the Grand Trunk Railway, Hamilton Section, between the Canadian Pacific Railway track leading to Queen's Wharf and the west city limit are carried.

Toronto Grade Separation, Part 1 B, extends from the west city limit to the Mimico Yard Office. These two works provide for the lowering of the tracks through Parkdale, or from the Canadian Pacific Railway, to Sunnyside, from which point the tracks are raised. Through Parkdale the streets are carried over the tracks by means of overhead plate girder bridges. West of Sunnyside the tracks are carried over the street by the same type of structure. For the most part these structures span the street with a line of columns down the centre. All bridges are solid floors, thoroughly water-proofed, with permanent pavements on the highway bridges, and ballast floors on the railway bridges.

The slopes of the excavation through Parkdale have been sodded. This adds materially to the appearance of the work and prevents, to a very great extent, the washing away of the banks.

In this work provision has been made for four main line tracks—two freight and two passenger. The grades and alignments have been materially improved, so that the tonnage hauled by any engine has been practically doubled, and the completion of the work will considerably increase the capacity of this very busy piece of track, which is operated jointly by the Grand Trunk Railway and the Canadian Pacific Railway and which is also used very largely by the Grand Trunk Railway light engines housed at the Mimico round-house. The trestle shown in Fig. 1 was used for making the necessary filling up to the established grade which was later extended in width by the use of side dump cars and spreader and by the shifting of the track on the dump as made. Fig. 2 shows the depression of the tracks east of the Sunnyside crossing. The tracks originally occupied the level shown a few feet below the street level, whereas now they occupy the lowest level seen in the picture.

The work of depressing and raising the tracks is finished, but the work of track laying, surfacing and aligning, in the vicinity of Sunnyside crossing and from there westerly, for a distance of about one-half mile is being completed. This section is behind the balance of the work, owing to the fill being delayed, as a new roadway had to be built to replace the Lake Shore Road, which ran parallel to the Grand Trunk Railway tracks, westerly from the Sunnyside crossing. The fill of the railway company now occupies what was the Lake Shore Road, which is located to the south of the trestle shown in Fig. 1. The new road which has been constructed to the south of the old road will, upon the completion of the work, be used as an approach to the overhead bridge which takes the place of the level crossing at Sunnyside.

The following bridges are either completed or in course of erection: Dufferin Street Bridge—completed. Dunn Avenue Bridge—steel erected and concrete floor almost complete; still to be water-proofed and paved. Jamieson Avenue—steel erected and temporary wooden floor provided for the continuance of traffic. Dowling Avenue—steel erected, concrete floor completed, water-proofing completed; leaving only pavement of the bridge for the completion of the job. Queen Street Sunnyside Bridge—masonry completed since early summer, steel being fabricated, earth approach nearly finished; this leaves only the erection of the steel, construction of floor, and the water-proofing and paving to be done. Indian Road Sub-

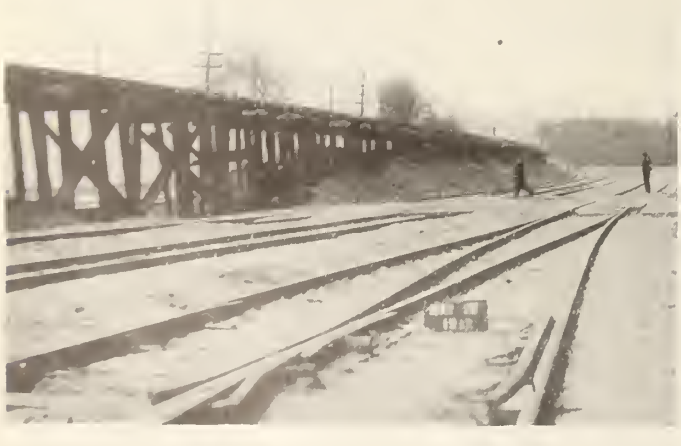


Fig 1—Parkdale grade separation, showing manner in which tracks were elevated

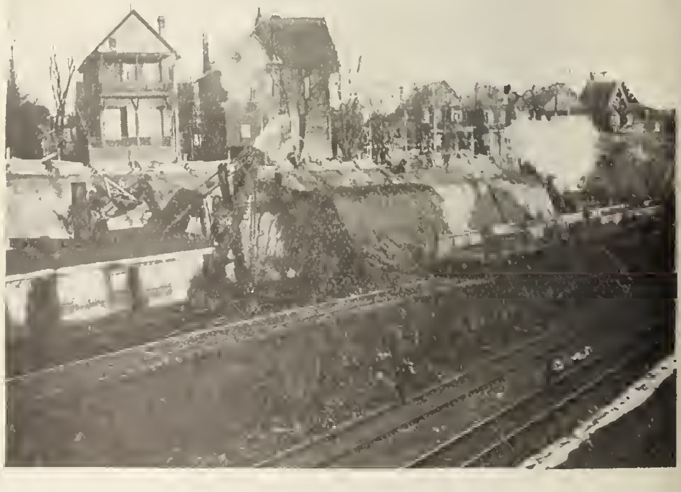


Fig. 2 — Parkdale grade separation, showing shovel cuts for track depression

way—four bridges erected, concrete flooring completed; water-proofing and ballasting still to be done. Howard Park Avenue Subway—completed.

The Grand Trunk Railway did all of the work of depressing and raising of the tracks by day labor, under the supervision of Mr. D. McCooe, Superintendent of Grade Separation, and Mr. J. R. W. Ambrose, Engineer of Grade Separation. The city did the necessary work of alteration to sewers, water mains, etc., and the Public Utility companies made the necessary alterations to their lines.

North Toronto Grade Separation.—This work was first planned on instructions from the Board of Railway Commissioners on the application of the Canadian Northern Railway for a western entrance for their Toronto-to-Hamilton line, which line runs parallel to the Canadian Pacific Railway North-Toronto line, from Summerhill avenue westerly to Dovercourt road, where the C. N. R. line diverts to the northwest. Several plans were prepared by the engineer for the city of Toronto, Mr. E. L. Cousins, before the order of the board was finally issued on May 23, 1912. The plan finally adopted provides for the joint use of the railway tracks by the Canadian Pacific Railway and the Canadian Northern Railway between Summerhill avenue and Dovercourt road, with a service track on the south side for the use of the Canadian Pacific Railway and one on the north side for the use of the Canadian Northern Railway.

On August 22 last construction was started on the first part of this work, namely the elevation of tracks between Summerhill avenue and Poplar Plains road. This provides for the separation of grades at Yonge street and Avenue road by raising the track 12 ft. and depressing the street 5½ ft., providing a clear head room of 14 ft. To date trastle work has been constructed from Summerhill avenue to a point 300 ft. west of Avenue road. From here to Poplar Plains road the first track has been elevated by elevating head room of 14 ft. To date trestle work has been done by the Canadian Pacific Railway by day labor. The work of the construction of the abutments for the Avenue Road Subway has been started by the contractors, Messrs. Jennings & Ross, who are under contract to complete the excavation and construction of abutments by December 31. This work is being carried on under the supervision of Mr. B. Ripley, Canadian Pacific Railway engineer.

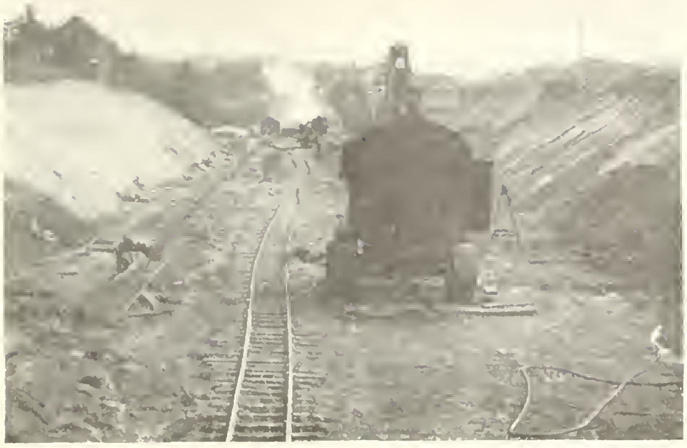


Fig. 3—Coxwell avenue subway, looking south from Grand Trunk Railway

BRIDGE DEPARTMENT

Since January 1st last, the Department has made surveys of all the steel highway bridges within the city limits, thoroughly inspected same and calculated their capacity, and installed signs limiting the safe loading and speed limit for each of these bridges.

Bridge Maintenance.—The floors of a number of bridges have been renewed. The investigation of all the bridges has enabled the Department to materially strengthen a few by the renewal of stringers, etc.

New Bridges.—The Department has completed the Weston road viaduct, which is composed of a reinforced concrete trestle with a steel through truss main span over the C. P. R. main lines on the line of Weston road. A new timber bridge over the Don River has been erected on the line of Park Drive. This bridge is set on pile foundations and is composed of two 60-foot timber truss spans. The Department has also constructed by contract the abutments and intermediate piers for the Coxwell Avenue Subway and will before the end of the year have installed the steel carrying the Grand Trunk main lines over this street. In addition to the construction of the abutments some 65,000 cubic yards has been excavated by steam shovel for the approaches to this subway. The excavation for the south approach is shown in Fig. 3.

Bridge Planning.—Since January 1st last, esti

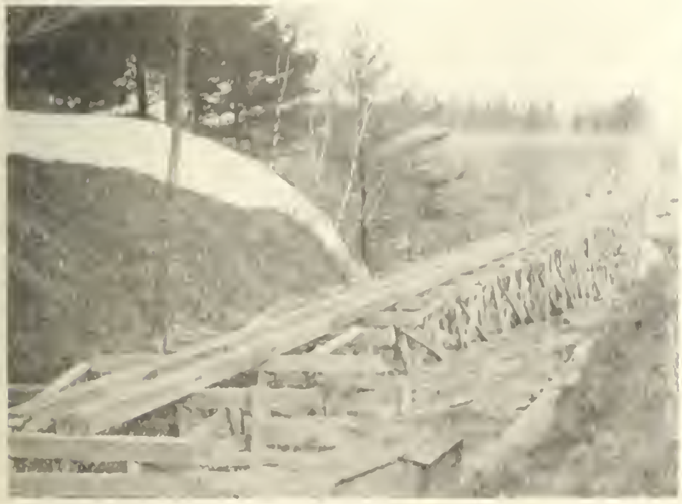


Fig. 4—St Clair avenue civic car line, Bathurst street hill

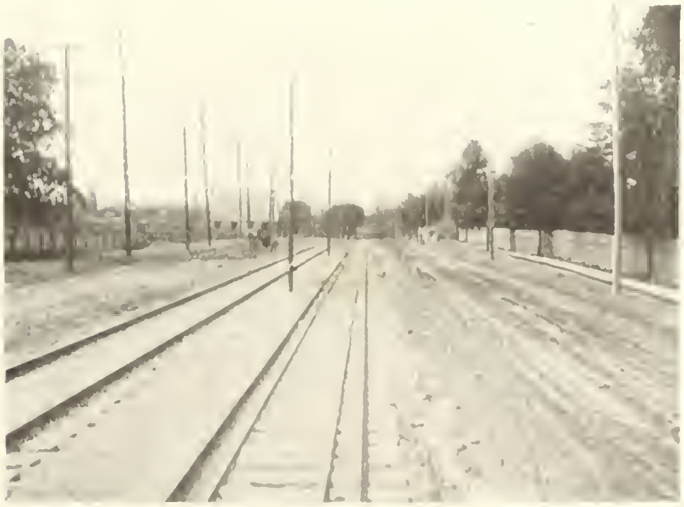


Fig. 5—St Clair avenue civic car line—graded, widened and tracks laid and lifted

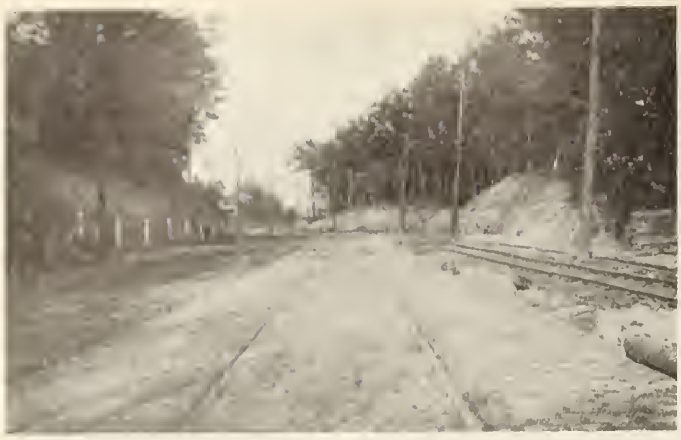


Fig 6—Gerrard street civic car line—Golf Club curve, after grading

mates have been prepared for the construction of the Bloor street viaduct along four different routes for the purpose of considering the relative merits of these different routes together with the cost of same. What is known as the "Terrace" route was adopted by council. Since then an estimate has been prepared for the construction of a viaduct along this route, which follows the sidehill from the corner of Bloor and Sherbourne for a distance of some 1600 feet to the line of Parliament street. From this point the line diverts to the north-east, crossing the Rosedale Ravine by means of a main span of 200 feet of two-hinged steel arch type, with suitable approaches. From this point where this line reaches the high ground north of the Rosedale ravine a curve leads right along the high ground to the west bank of the Don ravine, and crosses this ravine on the line of Danforth avenue produced by means of two-hinged steel arch spans. The total length of this viaduct, from Sherbourne to the easterly end, is 5,270 feet approximately. The Department has made a thorough survey of this route, together with the necessary levels and cross sections for the preparation of detail plans and specifications. Work on obtaining wash borings of rock, with core borings for a depth into the rock has commenced. Plans have been prepared for the construction of a reinforced concrete arch bridge, to replace a timber trestle, on the line of Crawford street, over Bellwoods Park. The Department is now working on the preparation of plans for the renewal of the steel truss spanning the Don Valley on the line of Gerrard street.

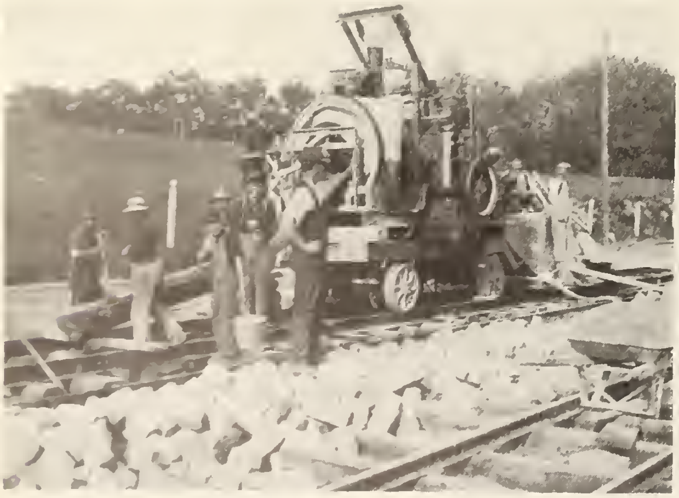


Fig. 7—Chicago cube mixer used on Gerrard street civic car line

The necessary work preparatory to calling for contracts is expected to be finished during the coming winter. Also, the Department contemplates the reconstruction of two small wooden bridges in addition to the usual maintenance work next year.

RAILWAY AND CIVIC CAR LINE DEPARTMENT

St. Clair Avenue Car Line and Widening.—This work extends from the northern division of the Grand Trunk Railway to Yonge street, a distance of 3.2 miles, where the street was widened from 66 ft. to 86 ft. for the portion from Yonge street to Avenue road, and to 100 ft. from Avenue road to the northern division tracks, with heavy grading work for the improvement of grades. In Fig. 4 there is shown the temporary trestle used for raising St. Clair avenue west of Bathurst to a height of 60 ft. above the ravine bottom, establishing a 2½ per cent. grade on either side of a 5/10 grade for a distance of 400 ft. in the centre of the ravine. This fill was widened to 100 ft. by shifting the tracks on which the cars were run. A double line of street car track has been laid for the entire distance on a 32 ft. allowance down the centre of the street. This track allowance is to be used entirely for street car traffic. The tracks are laid on 17-in. of gravel ballast, measuring from the top of tie to the sub-grade, with 7-in. of 2-in. stone from the top of the tie to the top of the rail—this to provide a neat appearance and minimize the dust. This line has a centre pole construction for the overhead trolley wires, as shown in Fig. 5, in which will be seen the tracks lifted and aligned and the street widened ready for the construction of curbs, pavements, etc., and for the broken stone top course. The picture also shows the narrow gauge track shifted off the roadway and placed between the permanent rails, which leaves the road open to vehicular traffic. On either side of this 32-ft. allowance is a curb, and outside of the curb an 18-ft. roadway for vehicular traffic. This work was started in the fall of 1911, under the supervision of Mr. E. L. Cousins. At the present time the entire track is laid, and about 75 per cent. of it is ballasted. All the poles have been erected and about one-quarter mile of trolley wire. This work will be completed by the end of the present year. The excavation was made by Thew shovel and the material hauled by three en-

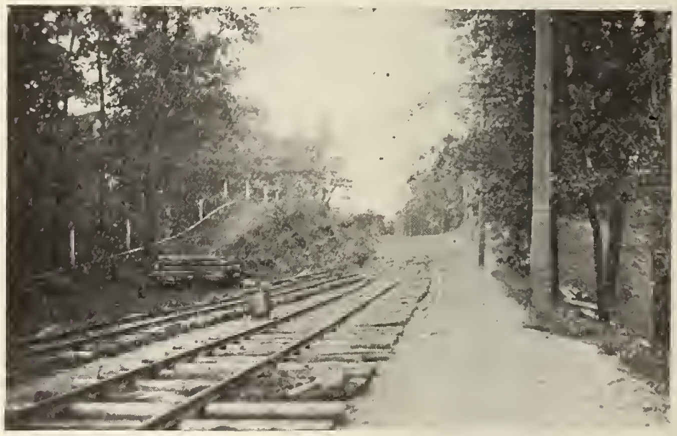


Fig. 8—Gerrard street civic car line—Golf Club curve, before grading

gines, twelve four-yard dump cars and two flat cars. The construction material was received on the Grand Trunk siding, alongside of which was constructed a temporary narrow gauge construction track, so that the handling of the material was minimized.

Gerrard Street Car Line.—This line is also a street grading and car line proposition. Unlike the foregoing, however, the street remains 66 feet in width, but all grading was made to this width as illustrated by Fig. 6. The road as existing previous to improvements is shown in Fig. 8. The car line is a double track main line, constructed on permanent concrete bed (Fig. 7 shows the track in course of construction) and with pavement between the rails, as shown in Fig. 6. The length of the work is 1.85 miles.

This work was started in the Fall of 1911, when most of the grading work was completed. The track laying, concreting, paving and overhead work were completed this year. The Department is now preparing to operate this line and expects to have it running early in December.

The excavation on this line was made by Marion Steam Shovel, and the material was handled by three engines, twelve four-yard dump cars, and two flat cars. Construction material was received on Grand Trunk Railway track, known as Coal Ramp Siding at York, alongside of which was constructed a narrow gauge construction track.

The Work of the Mechanical and Engineering Department of the City of Toronto

MUCH important work comes under the supervision of Mr. James Milne, mechanical and electrical engineer of the Works Department. At the main pumping station at the foot of John street it is planned to install two new pumping engines, each with a capacity of 15,000,000 gallons. An additional 1,000 h.p. will be furnished in boilers. A new chimney 170 feet high and 90 inches in internal diameter will be erected. At Centre Island it is proposed to put in an additional filtration plant with a capacity of 50,000,000 gallons daily.

The first completed tower of the Hydro-Electric Commission of Ontario

For the Gerrard street civic car line a power house, 96 by 30 feet, is now being erected. This building will be equipped with a 300 kw. rotary converter, to convert from 2,200 volts a.c. to 600 volts d.c., together with 300 kw. direct connected engine so as to provide steam for reserve in the event of hydro-electric power failing.

At the eastern end of the city it is proposed to install waterworks at a cost of between five and six million dollars. The project is in its infancy and the location has not yet been decided upon. The undertaking is an extensive one and will take five years to complete.

In addition to the above extensions, the filtration plant, all the pumping plants and the sewage disposal works are under the supervision of this department.

Electrical Facilities

TORONTO is well favored in regard to power facilities. An unlimited supply of power transmitted from Niagara is furnished by the Toronto Hydro-electric System and the Toronto Electric Light Company. The keen competition prevailing between these concerns results in low rates both in light and power. The transmission system of the Hydro-Electric Power Commission of Ontario is probably the finest in the world. Energy is received at 110,000 volts and is distributed to sub-stations at 13,200 volts. In the business section of the city the distribution is principally underground. The overhead covers more than 400 miles of streets. Primary lines are confined to a small percentage of the total street length covered. Practically all lines on residential streets are 115-230 volt secondaries, on concrete poles. No less than 26,000 concrete poles are in use. The down-town street lights consist of 5-light clusters, with 100 and 80-watt tungsten lamps. For lighting residence streets, and districts supplied overhead, special lanterns are employed, mounted on concrete and wooden poles, with 100-watt tungsten lamps. Approximately 450 5-light clusters and 32,000 lanterns are in use. It is estimated that the street lighting when completed will cost the city over $500,000 yearly. Toronto is now one of the best lighted cities in Canada. The Toronto Electric Light Company, with a view to ensuring the continuity of their service, are now installing a steam turbo-generator auxiliary plant. An additional precaution is the installation of a large storage battery plant.

Five-light cluster, Hydro-Electric System Toronto

Roadway and Sidewalk Construction

Practice of the City of Toronto in Respect to Various Types of Paving and Street Work—Materials Used

THE city of Toronto has an area of about twenty-eight square miles, and the legal machinery by which the Department of Works is permitted to carry out all roadway and sidewalk work therein is set forth at length in the Local Improvement Act.

In brief, these works may be recommended by Council under two methods: on receipt of a petition signed by 60 per cent. of the property owners, who represent 50 per cent. of the assessed property involved; or, upon the initiative principle. In the latter case the property owners have a chance of appeal, a petition signed by 51 per cent. of the owners, representing 50 per cent. of the property valuation, being sufficient to defeat the recommendation.

The Act has recently been amended to provide for cases where the efforts of the Department might possibly be nullified and, in any case, greatly hampered. This amendment provides for the paving of streets upon which it is absolutely essential that pavements be laid, and which the owners of the property adjoining might oppose. In these cases the property owners have not the privilege of an appeal, as the work is recommended in the "public interest."

Under this system the Roadways Branch of the Works Department laid during the past season a large number of works of various classes.

Asphalt—The preponderating factor in the pavement works laid as local improvements was the asphalt pavement, of which a total of 76 were laid, a mileage of 11.83 miles having been completed. In addition, there are also nine asphalts at present in various stages of construction, and which it is expected will be completed before the season closes. These nine pavements represented 3.66 miles, the total mileage undertaken, therefore, being 15.512 miles. Also, the old worn out asphalt was removed from four pavements and new surfaces laid, the length of this class of work being .850 miles.

Pavements of this class have been laid in Toronto for over twenty years and have given excellent satisfaction, being durable, readily repaired, comparatively cheap, and, at the same time, presenting a good appearance.

The actual type of construction has, of course, changed from time to time as traffic conditions necessitated. A few years ago two types were laid, known as the "Light Asphalt" and the "Heavy Asphalt." The light type consisted of a concrete foundation four inches in depth, which was laid upon the prepared subgrade, and an asphalt surface two inches in depth. This class of pavement was used exclusively for streets of a residential character. For streets carrying a larger volume of traffic, the heavy type was used. In this case the concrete base was six inches in depth, upon which was laid a binder course one inch thick, and a two-inch asphalt surface.

With the growth of the city, and the consequent large increase in the traffic, it became apparent that streets, which would formerly have been covered with a light asphalt, required a pavement of a stronger type. What the Department characterizes as a "Medium Asphalt Pavement" then came into existence. This pavement was provided with a five-inch concrete base and a surface consisting of a one-inch binder course, and two-inch asphalt top. During the last two years the light class has been abandoned, and only the medium and heavy types laid.

Bitulithic—Some years ago a pavement, known as bitulithic, was patented by Warren Bros., of Boston, and has been laid extensively in the United States and Canada. The original specifications called for a foundation of broken stone, laid to such a depth that when thoroughly consolidated a base four inches thick resulted. This foundation was then lightly sprinkled with a bituminous cement, and a two-inch surface of bitulithic mixture laid thereon. The surface was then wiped over with a light coat of bituminous cement, and finally a course of stone chips was spread over the entire surface. Of recent years, however, a four-inch concrete base has been adopted exclusively, the wearing surface being the same as above stated.

This type of pavement has been confined almost entirely to streets of a residential character, or streets

Danforth Avenue civic car lines

Endurite pavement laid in Exhibition grounds

Intersection at Bay and Adelaide streets

Wilton crescent, showing new street railway line

partially devoted to business, but upon which the traffic is not excessive.

To date 21 of these pavements have been laid in Toronto during the current year, a mileage of 3.459 miles being represented. Seven more are in an uncompleted state, but will in all probability be finished before the close of the season. These seven represent 1.87 miles, making the total 5.329 miles.

Brick—Brick pavements are, of course, familiar to every student of pavements and, when properly laid, furnish a very clean, durable pavement. Great exception is sometimes taken to the noise caused by vehicles on these pavements and, while it must be admitted that there is more noise than with sheet pavements, it is not an objection that detracts materially from the merits of brick as a paving material.

These pavements are laid in Toronto on either a four-inch or six-inch concrete foundation, according to the traffic which they are expected to carry. A cushion of sand, one and a half inches in depth, is spread to an even surface on the foundation and the bricks laid thereon. Having rolled the bricks to a smooth surface, the joints are filled with cement grout. The grouting is done in two operations, a one to one mixture of cement and sand being first run into the joints to about a half or three-quarters of the depth of the brick. The second mixture is two to one of cement and sand, and is swept into the joints until they are thoroughly filled. As soon as the grout has thoroughly set, the street may be thrown open for traffic.

Twelve brick pavements, totalling 1.225 miles, have been laid in this city to date, while three more will be completed before the winter. The total mileage for the season will then be 1.531 miles.

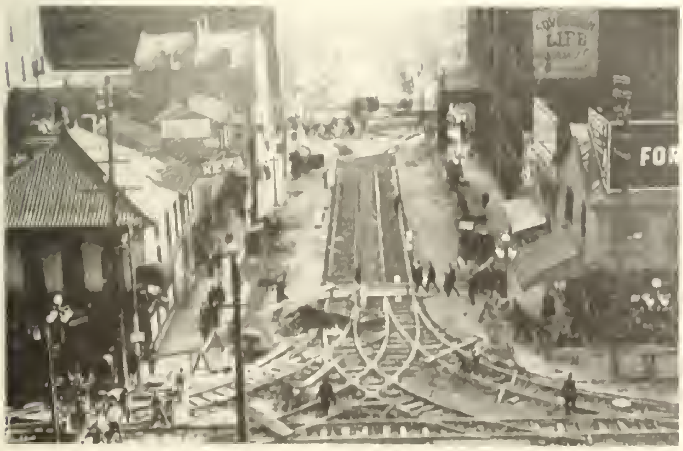
Concrete—The early concrete pavements laid in Toronto were laid in two courses, the base being of 1:3:7 concrete, four inches in depth. Upon this foundation a granolithic surface, mixed in the proportions of 1:1:3, was laid to a thickness of two inches. This surface was given a smooth finish, and blocked off into 8 in. x 10 in. rectangles.

These pavements did not give the satisfaction that was expected of them, and it was decided to adopt a monolithic type of construction. The more recent pavements have, therefore, been laid to a depth of six inches in one course, care being taken that the surface is thoroughly filled with mortar. The mixture used was 1:3:7, the stone being one inch in size.

It is doubtful whether any concrete pavement will stand up under heavy traffic for any length of time and, for this reason, concrete as a paving material has been confined to lanes, where the traffic is light. For this purpose, the pavements laid during the last few years have been quite satisfactory.

Eighteen of these pavements, representing 1.101 miles, have been laid this year, while two more are now under construction. When these are completed, the total mileage will be 1.206 miles.

Asphalt Block—Asphalt blocks as a paving material have been used for a number of years in certain places with varying results, and have also been used in Toronto to some extent. The specifications provide for a concrete base, four to six inches in depth,

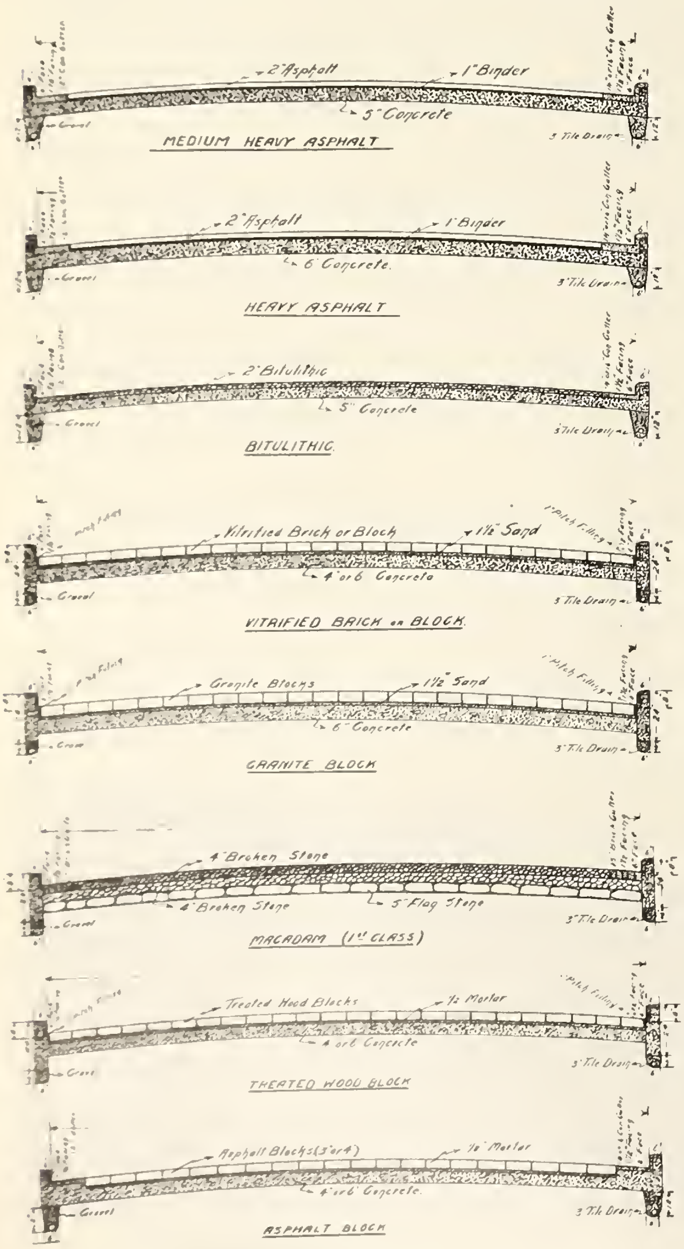


Intersection work at Bay and Queen Streets

Removal of pavement preparatory to laying street car line as the case may be, a mortar cushion one-half inch thick then being laid. The blocks are then bedded in this mortar cushion and, after being brought to an even surface, are grouted in a manner similar to that used in brick construction. Only one pavement of this type, .269 miles in length, has been laid to date, although four more are under construction and will shortly be completed. The total mileage will then be .769 miles.

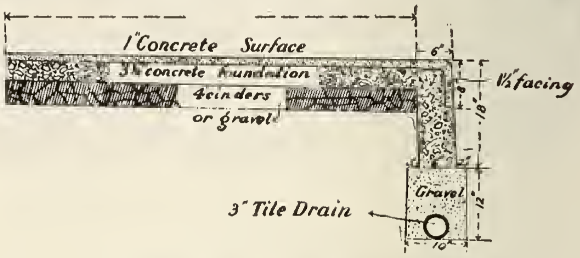
Cedar Block—The cedar block pavement, laid so extensively some years ago, is familiar to all and needs no elaboration. Its usefulness as a permanent paving material has disappeared and it is now used only in rare instances. Only one pavement of this type, representing .067 miles, has been laid in Toronto this year.

Asphalt-Macadam or Asphaltic Concrete—This pavement of recent years has been attaining some importance in many quarters. The sub-structure is the same as that used for asphalt pavements, while the two-inch wearing surface consists of a stone aggregate mixed with asphalt cement. This pavement, while laid in Toronto only during the past two years, promises to give very satisfactory results and, as it is comparatively cheap, it may possibly become in the future a large factor in the paving work of Toronto. Three pavements have been laid this season, the total mileage being .47 miles.



Cross-sections of pavements

Macadam—Macadam roadways have probably been laid more extensively throughout the world than any other type of pavement. Their usefulness for paving purposes in large cities, however, is not considerable. Generally speaking, macadam is either too muddy or too dusty, according to the weather, for use in cities. The maintenance question also becomes very prominent, as constant attention is essential to keep these roads in shape. On very heavy grades, however, macadam lends a safe footing for horses, and it is only in such cases that it is now used in this city.



Cross-section of concrete sidewalk

As laid in Toronto, this class of roadway consists of a foundation course of rubble, five inches in depth, laid by hand, the stones not to exceed 18 inches in greatest dimension, or be less than nine inches; an intermediate course of four inches of broken stone, not larger than three inches, and a top course of four inches of broken granite or trap, no particle of which shall be more than two inches in greatest dimension. Each course as it is laid is thoroughly blinded with sand and rolled until thoroughly consolidated.

Three roadways of this type are now under construction, the total mileage being .33 miles.

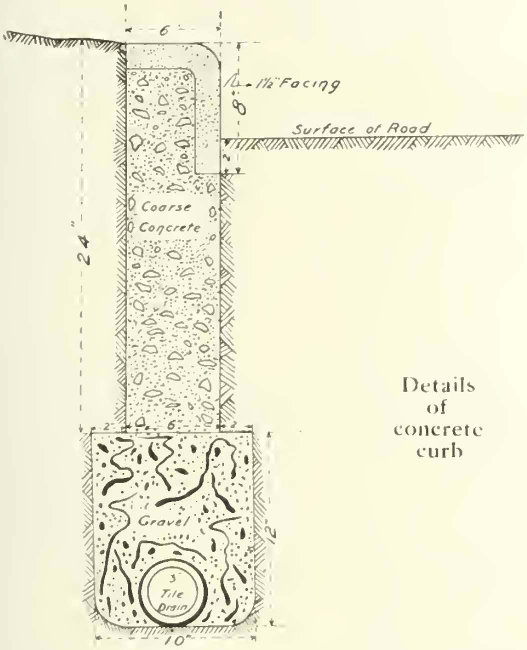
Concrete Sidewalks—In the early days of the city, stone flags were used for sidewalks. This material has been replaced entirely by concrete construction, which is much cheaper and can be laid much more expeditiously. Two classes of concrete walk are used in Toronto. For residential streets, a walk consisting of a bed of cinders, four inches in depth, a concrete base, 1:3:7 mixture, three and a half inches in depth, and a finished top, 1:1:3 mixture, one inch in depth, is laid. For heavily travelled streets the above specification is altered to provide for a granolithic top one and a half inches in depth, the same proportions being used.

Up to the present writing, 365 concrete walks have been laid, showing a mileage of 47.181 miles, while 21 more, representing 3.9 miles are in process of construction. The total for the year will, therefore, be 51.081 miles.

Day Labor System—For a number of years past the Department has been empowered by Council to tender, in competition with contractors, on all works for which tenders are invited. In the preparation of estimates for tendering purposes the actual cost of the work is estimated as closely as possible, and all necessary percentages for profit, maintenance, depreciation of plant, supervision, etc., are added.

In many instances the Department is the lowest tenderer, and the work is awarded accordingly. Should the contractor whose tender was next lowest show a disposition to undertake the work at the city's figure, the work, on recommendation of the Department, may be transferred to him by Council. This is done in many cases. There are, of course, contracts which the next bidder does not care to take at the city's figure, and also those which the Department declines to transfer. These, then, are constructed by the Day Labor force.

By the use of this system, a great saving is effected for the property owners. Should a contractor construct a work at the city's figure, the difference between the two tenders is saved. Should the Department carry out the work, only the actual cost of the work can be assessed against the property. In this latter instance, not only is the difference between the city's tender and that of the contractor saved, but also the difference between the actual cost and the city's tender.

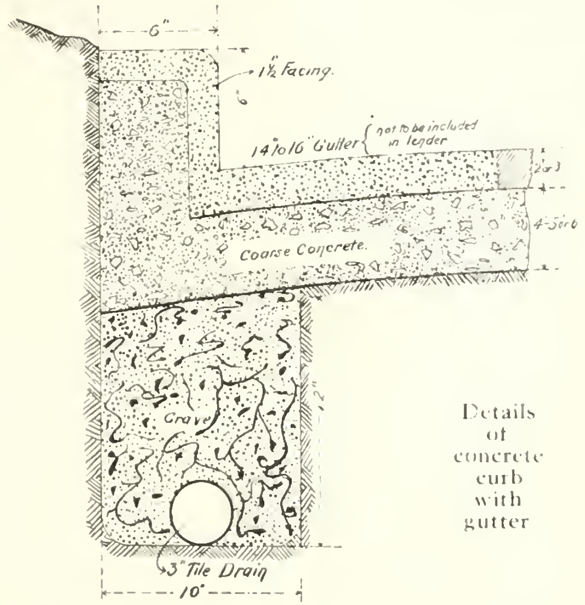


Details of concrete curb

Since its inception, this system has, for obvious reasons, given very satisfactory results, and of late years the day labor work has grown to very large proportions. Considering its popularity with the general public, this system bids fair to attain still larger proportions in the future.

Under this system there will have been constructed at the close of the season of 1912, 201 local improvement works. In addition, about 10,800 square yards of asphalt macadam and a large amount of concrete walk was laid in the Exhibition Grounds.

Track Allowance Work—For some years past the Department has done all pavement and foundation work in connection with the Toronto Street Railway Company's tracks, the company furnishing all new steel, ties and fastenings where required.



Details of concrete curb with gutter

Various types of foundation have been used in past years and all have been more or less unsatisfactory. The form of construction used at present, however, consists of a concrete foundation twelve inches in depth, in which wooden ties laid to two-foot centres are embedded, the rails being spiked to the ties.

The subgrade having been prepared to proper depth, the steel is laid and spiked to ties, the tracks

TABLE SHOWING MILEAGE OF DIFFERENT CLASSES OF PAVEMENTS, ROADWAYS AND SIDEWALKS LAID FROM 1890 TO 1911 BY THE CITY OF TORONTO

Class of Work	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911
Pavements and Roadways	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Asphalt	1.73	1 635	0 216	5.607	3.067	1 156	0 366	0 460	3 408	6 215	6.348	4 449	5 237	6.662	6 336	5 401	11 600	17 276	21 030	15 411	11 811	15.55
Bitulithic														0 063	1 528	1.635	2 759	4 348	5 396	5 003	6 055	6 160
Cedar block on sd. and plk foundation	15 51	9 186	3 349	3 249	0.852	1 753	0 328	2 459	4 801	3 151	7 842	2 725	2.191	1 774	0.511	0 630	1 441	0 089				
Macadam		0 123	0 494		0 059	1 663	1 661	0.510	2 089	5.018	2 563	2 733	5 486	2 737	1.906	3.378	1.593	1 434	0 973	0 086	*0 614	2 [illegible]
Tar Macadam														2 148	0 920	1 25[illegible]	0.247	0 738				
Cobble	0 10	0 069	0.860								0.008											
Tamarac on Concrete	0 192	0 77																				
Cedar Blk on Concrete	. .		8 416	2 185	0 826	0 227	0.038		0 083	0 079		0 021		0 069		0 500			0 060			
Stone Setts on Concrete			0 705	3 748	2 563	0 083					0 107	0 028		0 427		0 662		0.057				0 068
Scoria on Concrete	0.138		0 028			0 117			2 586	1 367	1 247	0 669			0 633	0 600						
Asphalt Block																		0 281	0 546	2 334	0 082	1 751
Brick on Concrete				8 964	0 787	0 741	1 03[illegible]	[illegible]	0 079	3 670	5 472	2 885	4 27[illegible]	2 602	2 876	3 751	1 504	2 800	2 3[illegible]	1 611	1 692	[illegible]
Brick on Gravel							0 028	0 8[illegible]	[illegible]	0 943	0 057											
Brick on Broken Stone										0 546	0 516	1 627										
Treated Wood Block																		0 396			0 149	
Concrete Pavements						0 671			0 057				0 011	0 147	[illegible]	0 165	0 144	0 448	[illegible]	[illegible]	1 013	[illegible]
Gravel								3 148	4 750	0 069	0 301	0 222										
Reconstruction track allowance											0 203	0 270	0 186		0 398		2 403	5 530	8 280	7 0[illegible]	9 [illegible]	1 488
Granite Block track allowance																	2 537		0 204	3 118	3 90[illegible]	0 188
Vitrified Block track allowance																	0 971	3 341				0 700
Asphalt Block, Scoria, Treated Wood Block, Macadam track allowance																						3 [illegible]81
Totals	17 670	11 090	19 574	18 748	8 1[illegible]	6 816	3 553	1 [illegible]08	[illegible]	21 120	24 [illegible]	15 629	17 413	16 839	14 7[illegible]	17 982	25 097	[illegible] 401	[illegible]	[illegible]	[illegible]	[illegible]
Sidewalks																						
Concrete	1 426	1 030	1 508	2 249	1 137	1 918	0 602	1 060	[illegible] 48	5 474	15 227	17.96[illegible]	27 36[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Stone Flag	1 273	0 398	0 104	0 045	0.011																	
Brick							0 294	0 823	1 188	0 292	0 038	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]			
Totals	[illegible]	2 [illegible]28	1 61[illegible]	2 294	1 148	1 918	0 898	1 87[illegible]	[illegible]	5 766	15 26[illegible]	17 816	27 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

being then lined and topped, and the concrete foundation above alluded to then laid. This foundation is placed in two courses. The first course, about eight inches in depth, is thoroughly tamped under and around the lower part of ties and the concrete allowed to set; the top course is then laid flush with the base of the rail. As soon as this top course has set sufficiently, the mortar cushion is spread and the blocks laid thereon and grouted or pitched, according to character of block.

A very large amount of this kind of work has been done this year by day labor, and may be subdivided as follows:

New Track Reconstruction. Includes renewal of steel and complete renewal of foundation and pavement	4.2 miles
Civic Car Lines (New Construction) On Danforth avenue	1.2 miles
Track Allowance Reconstruction. Includes placing sufficient concrete under old steel to properly adjust grade, and renewal of pavement	2.26 miles
New Track Allowance on Wellington street, from York to Church	.45 miles
Total	8.11 miles

There were also laid seven large intersections, as follows: Yonge street and Wellington; Scott street and Wellington; York street and Wellington; Queen street and Spadina; Dundas and Keele; Dundas and Humberside; Lansdowne and Royce.

Immense Brick Plant for Edmonton

Forty million brick will be the output for a season of nine months of the Acme Brick Company, of Edmonton, Alta., in 1913, when it completes the installation of new machinery in buildings to be erected six miles northeast of Edmonton this fall and next winter. The present output of 75,000 brick a day will be increased to 200,000. The improvements will be made under the direction of W. B. Lawhead, engineer, who is now at Spokane, Wash., arranging for the establishment of a plant there.

The company has placed orders for more than $20,000 worth of machinery, and will spend about $60,000 between now and next spring. There will be six permanent kilns, using the Boss system of burning; a Justice radiated heat dryer, a stiff-mud Freese machine and a pulverizer. The present equipment consists of six kilns, a cutting machine and the other necessary apparatus.

Preparations are also being made to use a steam shovel in the clay deposit, which is 35 feet in depth. The shovel will be of a capacity of lift between 600 and 700 cubic yards of material daily. Other improvements are cottages for men with families and a bunkhouse for workmen.

The completed plant will be able to furnish enough brick for Edmonton for a number of years to come, but, notwithstanding that fact, the management instructed Mr. Lawhead to place his layout with a view to further extensions without interfering with former work. When the plant is in full operation, it will require the services of 100 men continuously. The plant will be running at full capacity early next May.

The company will be able to place brick on the market at a reasonable price, from the fact that with its large capacity it can manufacture brick at a much lower cost per thousand than where the production is on a small scale. It already has orders for 5,000,000 bricks for delivery next year, which it can easily take care of with the enlarged and thoroughly up-to-date plant.

In the roadway division of the City Engineer's Department during the year ending December 31, 1911, the total work undertaken and carried to completion consisted of seven hundred and sixty-two separate works, of which fifty were pavements and sidewalks, which were laid to replace those destroyed by the construction of new street railway lines, and certain works constructed in Exhibition Park at the request of the Industrial Exhibition Board. Of the remaining seven hundred and twelve works, five hundred were constructed under contract, one hundred and ninety-one by day labor, and the remaining thirteen by private contract under the supervision of the Department.

The Koekuk dam for the Mississippi River Power Company, at Keokuk, Iowa, is rapidly nearing completion. All arches and piers are finished. Concrete for the last arch which effected the closure between the dam and the upper end of the power house was deposited Oct. 16. The Illinois division, which handled this part of the work, has already started placing concrete to form the spillways under the arches, raising each spillway 5 ft. at a time all the way across the river. There are 119 sections, each 30 ft. long, between the 6-ft. piers, forms for which were fabricated out of steel. About 6 hours' time was required to take down the forms for one pier, move them forward and re-erect them with the travelling derrick. The steel, three-hinged arch forms, erected with the help of the cantilever traveller, required 45 to 60 minutes to take down, move forward and re-erect.

The cost of bridge maintenance at Grand Forks, N.D., is made high by reason of the fact that the banks of the Red River of the North, as noted in this journal on Oct. 12, move toward the center of the stream. This movement, according to the latest biennial report of Mr. H. G. Lykken, city engineer, while not the same in amount every year, averages a little more than 1 ft. per season. This necessitates a readjustment of the approaches and the end bents of the bridge itself almost every year. The cost of maintaining two of the municipal bridges, each having a total length of about 625 ft., has averaged about $4,000 per year during the past 10 years.

"Out of nine firms specializing in reinforced concrete in New York City some three years ago I have been told that only three survived the year," remarked Leonard C. Wason, president of the Aberthaw Construction Co., in a recent paper. Mr. Wason further stated that in the field with which he was familiar only two concerns which he had known in the past seven years had continued to specialize in reinforced concrete. He believes that the losses in this particular trade, aside from the lack of knowledge of job costs, can be explained because of the large overhead and lack of proper accounting.

Last year there were 1,593 alarms of fire in the city of Toronto, with an attendant loss on buildings of $166,562.

City of Toronto's Main Drainage System

Extensive Works Now Looking to Completion—High and Low Level Trunk Sewers—Sedimentation Tanks—Design and Construction

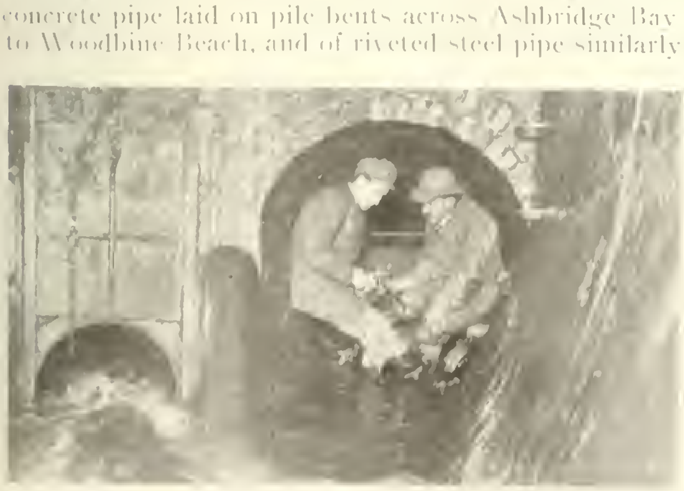
THE close of the present year will see the completion and, it is expected, the operation, of the Toronto Main Drainage Works. In 1908 a grant of $2,400,000 was obtained to cover the cost of the works, the design and construction of which were commenced shortly afterwards. The system comprises a high and low level trunk sewer for the collection of the sewage, a combined pump and screen house, sedimentation tanks, submerged outfall sewer and a sludge disposal area.

The High Level Interceptor proper runs from Stanley Park to the disposal plant, situated just west of the Woodbine, along the line of Adelaide street and Wilton avenue, crossing the Don River in the locality of the latter. The high level extension runs west from Stanley Park to Roncesvalles avenue where it picks up the West Toronto sewage. This sewer will collect all sewage north of, approximately, the line of Adelaide street from West Toronto to East Toronto, and carry it by gravity to the disposal works, a maximum distance of 10½ miles.

The Low Level Interceptor is 4½ miles in length and runs from Bathurst street to the disposal plant along the line of Front street and Eastern avenue, and carries the sewage from the area south of the high level interceptor by gravity to the pumping station. Here it has to be raised by centrifugal pumps a distance of 25 feet, to reach the level of the high level interceptor.

In passing through the pumping station the sewage from both interceptors is screened by mechanically-operated screens and measured by Venturi meters, after which the channels join and the sewage enters the sedimentation tanks. Through these it travels at a sufficiently low velocity to allow the solids in suspension, or sludge, to be deposited in the bottom of the tanks. The sludge is removed through drains to the sludge well, located in the pumping station, from which it is pumped to the disposal area, while the clarified sewage, or effluent, passes on to the outfall sewer.

The Outfall Sewer is constructed of reinforced concrete pipe laid on pile bents across Ashbridge Bay to Woodbine Beach, and of riveted steel pipe similarly supported for a distance of 3,200 feet into the lake. The sewage is discharged at a depth of 25 feet and over a distance 500 feet through perforations in the side of the pipe.



Interception of the Yonge Street sewer. The passage to the left runs to the high level interceptor

The sludge disposal area consists of a lagoon formed by sheet-piling in the east end of Ashbridge Bay. In this the sludge will be pumped, and, during storage, will be reduced by digestive action.

There are two works of interest at present in progress in connection with the high level interceptor. One is the removal of excavation in tunnel under compressed air on Liberty street and the other is the laying of a concrete pipe syphon 5700 feet in length up the Don flats to collect the sewage in the Rosedale Creek sewer.

Section No. 15, High Level Interceptor. A 5,000-foot concrete pipe inverted syphon. The trench is left open so that hydrostatic test may be applied

The section on Liberty street is a 4-ft. 6-in. circular brick, and for a considerable distance lies at a depth of from 25 to 30 feet. The work might have been done in open cut or tunnel at the contractor's option, and it was decided to attempt it in tunnel and employ compressed air to assist in the removal of what was known to be wet, running sand. A trench 100 feet long and 10 feet wide was excavated down to grade and carefully sheeted. In this a circular concrete shell was built of sufficient size to allow the placing of an inner ring of brick to bring it to the diameter and grade of the sewer. A shaft was located at the centre of this section to give access to the locks, and for the removal of material, and having a sump below it to which the water might drain. A lock is placed on either side of the shaft so that work may be carried on in both directions. Each consists of two steel bulkheads spaced about 12 feet apart, in each of which is an equalizing valve and an air tight door, large enough to permit of the passage of the cars in which the excavated material is removed. Air is supplied by a motor driven compressor, and introduced to the work on either side of the shaft between the lock and the working face.

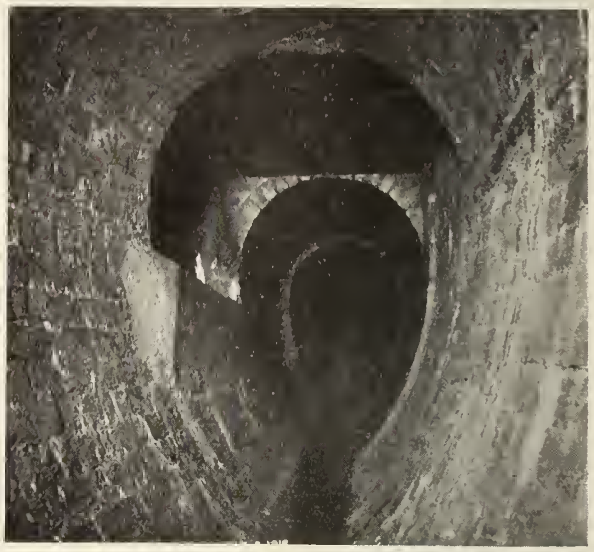
When the preparation for the work had been thus completed the trench was back-filled and the timber sheeting, which was left in place, cut away from in front of the ends of the section. In order to prevent the escape of air up behind the sheeting, a concrete apron was built at this point a few feet out over the top of the proposed work. When the air was turned on, it was found that a sufficient seal had been obtained. A pressure of from 6 to 7 pounds a square foot was sufficient to hold back the water in the ground and secure a dry heading.

High Level Interceptor—a junction in the tunnel

Sections Nos. 14 and 15 comprise the connection to the Rosedale Creek sewer. The latter is an inverted syphon built of 42-inch reinforced concrete pipe, running from the point of interception about 2,500 feet west of the Don River on the Rosedale Ravine Drive, down the Drive and the Don Flats to the top of the Cornwall street hill. Section No. 14 makes connection from this point with the interceptor on Mark street by way of Cornwall and River streets.

The difference in elevation between the high and low points of the syphon is about 21 feet, and the net difference in the two ends is 7 feet, giving an hydraulic gradient of 1 in 800. A wash-out to the Don is placed at the low point, so that the syphon can be emptied and cleaned if necessary. Lock Joint Pipe, centrally reinforced, were used for the work, of which it was required that one out of every 250 should be tested under an internal hydraulic pressure of 14 pounds per square foot, and also that one test should be run on a joint, a concrete collar for which was to be specified and guaranteed by the maker of the pipe.

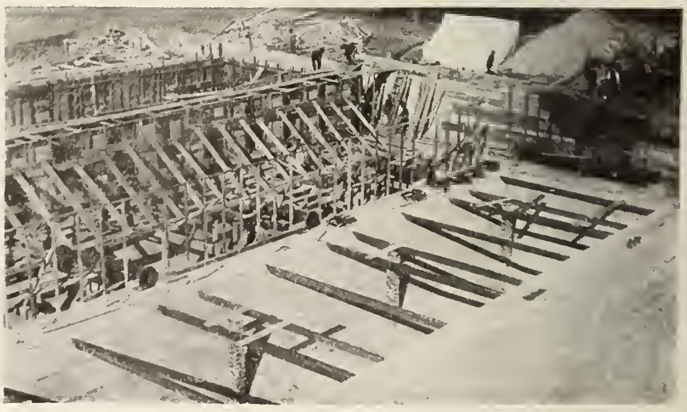
A departure was made in designing the pipe to be laid on curves for the syphon. Since the operation of the syphon would practically depend on the tightness of the joints between the pipes, a special bend was made to be used at the beginning and end of each curve. The standard bend for the curve is made from the straight pipe by depressing one side of the top plate of the mould a sufficient amount to compensate for the difference in distance of the two walls of the pipe from the center of the curve. To form a true curve with tight joints it will be seen, however, that in making the pipe for the beginning and end of the curve the mould should be depressed only half the distance used on the standard bend. In this way every bend on the curve makes a tight joint with its neighbor. With the use of a reinforced collar, in addition, a watertight job was obtained.



Low Level Interceptor, showing overflow chamber, end of connection pipe, manhole and change of section

The pipe laying, which was done under a separate contract, consisted of backing the pipe in two inches of concrete, making the joint and placing the collar. An hydro-static test was similarly applied to the completed sewer. As much as 400 feet of pipe line have been tested at one time to 14 pounds pressure without the indication of any leakage whatever.

Outfall sewer. – Lowering a 100-foot section of the 60-inch steel pipe



Sedimentation tanks in course of construction, showing the hopper bottoms

The high level interceptor, east of Bay street, and the sedimentation tanks were put in operation for a short time early in July. The apparatus worked satisfactorily, but it was deemed advisable to instal temporary chlorinating plants before the operation of the system was proceeded with. In view of the increased efficiency given to the action of chlorine by long contact, it was decided to place the chlorinating apparatuses on the lines of each sewer where they cross the Don River, and introduce the germicide into the crude sewage, rather than take advantage of the sedimentation process and have only the short period in the outfall sewer for contact.

A proposal is now being considered to construct a single sedimentation tank of the Imhoff type, and a sludge drying bed, so that a test on a full scale may be conducted and reliable information obtained as to the applicability of this process to local conditions.

The work still before the Department consists of collecting the sewage in the areas south of the low level interceptor. It will be possible, on some six or seven streets east of Parliament street to lay a sanitary sewer running north to the interceptor and collect the sewage thus by gravity. West of Parliament street, however, sufficient grade cannot be obtained and the sewage from the area as far west as Bathurst street will be collected to a well and pumped to the interceptor. A further area west of Bathurst street, and south of the Grand Trunk tracks, will be treated in a similar way.

With regard to the sewage disposal plant, all the work originally designed will be completed this year, but in order to keep pace with the advances made in disposal methods within recent years, it is not unlikely that alterations and additions of some considerable extent will be required before long.

Reinforcing a Sewer Which Settled

SETTLEMENT of the ground upon which it was built was responsible for the destruction of a short section of 8 ft. 9 in. circular sewer of the main drainage works at Toronto. The accident and the methods used for reconstructing the sewer are described in the 1911 annual report of Mr. A. B. Garrow, assistant engineer. For a distance of 300 ft. near the Don River the sewer had to be constructed upon a filled-in portion of the river bed. The shallow excavation, 8 ft. at the most, showed a fairly good clay which, it was estimated, would support the weight of the piers upon which the sewer was to be built.

A considerable portion of the invert had already been constructed before it was noticed that the whole 300 ft. of sewer was sinking. Observation showed that all the ground in the immediate vicinity was undergoing a similar change in elevation. The first crack appeared in the invert of the sewer, about midway between the west end and the bank. This quickly widened, and with the appearance of others, destroyed the continuity of the work. The back filling, which was proceeded with, increased the settlement that already had occurred, reaching finally a maximum of 3 ft.

Reconstruction was commenced. It was decided to leave in place and underpin a 100-ft. section upon which the maximum settlement was 16 in., and to tear out and reconstruct the remaining 200 ft. Piles were driven close to the interceptor on both sides at 4 ft. centers, the centers of the two piles of each bent being 12 ft. 9 in. apart. The process of underpinning was to cut off the piles 22 in. below the bottom of the sewer and on them to construct a reinforced concrete cradle, 18 in. wide.

The task of tearing out the remaining 200 ft. of the sewer was a laborious one, for the steel reinforcement consisted of ⅝-in. rods. When the old concrete and brick invert had been removed down to grade a third pile was added at the center of each bent, and all were cut off 13 in. below the bottom of the new work. These were capped with a concrete beam 15 x 18 in., reinforced with 5⅞-in. rods. In this instance the invert up to the springing-line and cradle were poured together, and vertical dowels were left protruding at the haunch for bonding the arch. The new work was set to the original grade and connection made with the underpinned section, the grade of which was not corrected, in one 25 ft. length.

Another Loft Building for Montreal

Versailles Building
Montreal

Montreal is to have another loft building, to be known as the Versailles Building. It will be constructed from plans by Messrs. Ross & Macfarlane, Montreal, on St. James street, just east of Place D'Armes. The structure will be ten storeys, of fireproof materials, the exterior being of Indiana limestone and the interior construction of concrete and steel. The main floor has been planned for banking premises, entered from a spacious main entrance hall, the walls and paving of which will be finished with selected marble, the ceiling coffered and enriched, and the entrance and elevator fronts of ornamental bronze metal. From the same hall the upper floors will be reached by means of two passenger elevators and fireproof stairways.

The office floors are at present laid out as lofts, which will be sub-divided as required by the several tenants who will occupy the building. Ample lavatory accommodations will be provided on each floor. Light will be obtained on three sides. The windows will be of hollow metal and plate glass, and the finish of the interior red oak, except the floors, which will be maple. The rentable area of the ground floor, exclusive of the bank vault, is 1,620 sq. ft., and on each of the office floors 1,820 sq. ft., or a total area of at least 18,000 sq. ft

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There are three steam railroads making Toronto a divisional point, namely the Grand Trunk Railway, Canadian Pacific Railway and Canadian Northern Ontario Railway. The mileage of each within the city limits is ninety, thirty-six and ten respectively.

Mainly Constructional

The News in Brief From the Atlantic to the Pacific.

The City Council of Toronto approved of a $250,000 by-law for the Hospital for Sick Children.

It is expected that the township of Markham, Ont., will vote the sum of $100,000 towards the good roads movement.

The new trunk sewer for Berlin, Ont., is expected to cost from $75,000 to $100,000. Work will probably be started in the spring.

The city of Edmonton will start the erection of a three-storey market building, early in 1913, at a cost of approximately $100,000.

The Montreal Island Company, Limited, Montreal, Que., has been incorporated with a capital of $5,000,000 to undertake important constructional developments.

Building is going on apace at St. John, N.B. Several buildings now in course of construction will, when completed, add greatly to the appearance of the city.

The City Hall authorities of Hamilton, Ont., are considering a proposal to construct a sea wall a mile in length along the filtering basins, thus adding greatly to their capacity.

The William Galloway Company, of Waterloo, Iowa, are expected to commence shortly the building of a large plant at St. Boniface, Man., where a valuable site has been purchased.

The city commissioners of Calgary have recommended that a by-law be submitted to the people asking for the appropriation of an additional $60,000 to the present municipal paving plant.

The Stone Cutters' Union of Montreal have asked the Board of Control that in future construction of municipal buildings contractors shall be required to use stone cut and trimmed in the city.

Tenders are expected to be called shortly on the McBride theatre at Victoria. Every effort will be made to have the interior equipment as perfect as possible in regard to accoustics and sight planes.

The annual dinner of the Regina Engineering Society was held in the cafe of the Parliament Buildings of that city on November 7th. The president suggested the need of permanent quarters for the society.

The final report of the Greater Vancouver sewage may be expected shortly, according to the statement of Consulting Engineer R. S. Lea, who has been acting for the Burrard Peninsula Sewerage Commission.

Building operations in Oshawa, Ont., are continuing briskly, and are expected to go on without cessation right through the spring. An ambitions building programme has been prepared by the town for next year.

Powers are being sought from the Quebec Legislature for the construction of a railway from Calumet village, in Argenteuil county, to a point near St. Jovite village, Terrebonne county. The capital stock is to be $1,000,000.

Information which has become available shows that during the five months, June, July, August, September and October, during which the cement duty was reduced, 988,393 barrels entered the country. The value was $1,328,937, or $1.34 a barrel. The consumption of cement in Canada this year probably was eight million barrels. During the same period in 1911 the importation was 449,584 barrels, valued at $560,559, or $1.24 a barrel. The American manufacturers thus advanced the price by ten cents a barrel.

The Court House Building at Calgary is rapidly nearing completion. This building has been designed to provide the maximum of convenience and will have all the latest improvements suitable to a building of this nature:

Mr. C. H. Rust, city engineer of Victoria, has asked the city council to submit a by-law asking for approximately $700,000 to complete the sewer work, and for a further sum of $225,000 for the buildings of the Royal Jubilee hospital.

Mr. W. C. Dunn, of Edmonton, vice-president of the Security Coal Mines, Limited, and his associates, are preparing to incorporate a company which will erect a fifty-six-suite apartment house, costing $200,000, on the south side.

Messrs. Barker, Greer & Wigle, of Winnipeg, recently sold 88 feet on Portage avenue between Vaughan & Kennedy streets at $3,100 a foot, or a total of $272,800. This property could have been bought two years ago tor $1,700 a foot.

Mr. W. T. Kennedy, president, and Mr. N. Vermilyea, vice-president, of the Ontario Good Roads Association, have been appointed delegates to represent that body at the convention of the American Road Builders' Association in Cincinnati.

It has been decided that the weekly lunch talks of the Montreal Builders' Exchange, which were so successful last season, will be commenced at the beginning of 1913. A committee has in hand the arrangement of speakers and subjects.

Plans are now ready for the new provincial jail at Victoria and tenders will be asked for in the next few days. The design of this institution incorporates the most modern ideas in this work. Accommodation has been provided for 140 prisoners.

Before a meeting of the Regina Society for the Advancement of Art, Literature & Science, at the Regina Collegiate Institute, Dr. W. W. Andrews recently stated that clay was the second of the assets of Saskatchewan, wheat being the first.

The Montreal Harbor Commissioners have under construction a new pier at Pointe aux Trembles, at a cost of $300,000. Its length will be 100 ft. and width 500 ft., being built of concrete. It will be completed by next spring, and will then be used by the Canada Cement Company.

The Montreal City Council have decided to carry out during the next two years public improvements promised to certain municipalities when they were annexed to the city. Owing to the extensive character of the work, it has been found impossible to do it within the time originally agreed on.

Owing to the condition of some of the tracks of the Montreal Tramways Company, the city is seeking authority to compel the company to relay the tracks, including eighteen inches on either side. In case of default, it is asked that the city be in a position to impose a fine on the company.

Building operations are expected to commence very shortly on the new premises for the Bank of British North America at St. John, N.B. The structure will be of three storeys, the two upper ones being let out for offices while the lower one will be devoted entirely to the business of the bank.

Work is to be started immediately upon the new bridge at Brilliant, B.C., which is to span the Columbia River. All the steel is now on the site and the Hon. Thomas Taylor has promised to advance $10,000 in payment for the same. The new bridge, besides giving convenient access to the Doukhobor settlement at Brilliant, will be of considerable general advantage in facilitating vehicular traffic on the road between Trail and Nelson.

The Canadian Northern Railway are rushing work with all possible speed at their construction headquarters on Alberni Canal, between Franklin and Coleman Creeks, B. C. There are at present four construction camps along the canal, and two hundred men are engaged in clearing the right-of-way.

An important Toronto concern that has recently secured articles of incorporation is the Bakeman Wilkinson Company, Limited, manufacturers and dealers in railway and contracting supplies. The incorporators include Mr. J. R. L. Starr, Mr. M. C. Cameron and Mr. J. Aitchison, barristers, all of Toronto.

The second largest floating drydock in the world, fittingly called after Canada's Royal Governor, was inaugurated recently at Montreal, by the Duke of Connaught. The huge dock, which has a lifting capacity of 27,500 tons, was placed in position a few days ago after a sixty-two days' voyage across the Atlantic.

A well-attended "Smoker" was held by the Engineers' Club of Toronto at their King street headquarters on Friday, November 15. Upwards of one hundred members were present and a most enjoyable evening was passed under the chairmanship of Col. Van Nostrand. The proceedings were enlightened by recitation and song.

Application will be made at the next session of the Dominion Government for the incorporation of the Quebec Rapid Transit Company, with powers to construct a railway from a point in the city of Quebec, through Montmorency to Lake St. Charles, making a belt line from the city of Quebec through the county of Quebec.

In an article, "Terra Cotta Structural Decoration," published in the Contract Record of November 6, there appeared an illustration of a polychrome panel executed in architectural terra cotta. This panel was made by the New Jersey Terra Cotta Company and is erected on the gable of the main building of their factory at Perth Amboy, N.J.

Mr. William Douglas Caroe, F.S.A., the famous London architect, who has been engaged by the British Columbia Government as the leading member of the commission to pass on the architects' plans for the new University, stated that the site selected for this building was an ideal one, and that the structure would be one of which the whole Empire might be proud.

Negotiations are under way for one of the largest real estate transfers that has ever taken place in Toronto, involving as it will $1,265,000, and causing many of the largest apartment houses in this city to pass under the control of one company. The agent of an English syndicate is carrying on negotiations with the owners of the properties with a view to their acquirement

The Calgary Architectural Club, an organization for the advancement of architecture and allied arts and crafts, recently held its first meeting at the rooms of the Calgary Chapter of the Alberta Association of Architects All who are interested in this Association may apply to the Secretary, Mr George A. Oman, 501 Beveridge Building, Calgary, for further particulars

Official announcement is made by the Board of Commissioners of Edmonton that the municipality will expend approximately $12,000,000 on civic improvements and betterments during the fiscal year beginning November 1 In a letter of instructions to the heads of departments the Commissioners say "It would be fatal in the best interests of the city not to make a supreme effort during 1913 to equip on modern lines, at least sufficiently to catch up with the needs of the present and attempt to meet the future needs as far as is justified by the condition of the money market."

J. D. McArthur, contractor for grading from Edmonton to Dunvegan, states that seventy miles of grade on the Edmonton, Dunvegan & British Columbia Railway will be ready for steel in a few days. Three locomotives will be used in the track-laying operations. Work is to continue throughout the winter. The company's office staff will be moved to Edmonton next month.

Mr. James Henderson, architect, has completed plans for a five-storey warehouse, 51 by 150 feet, to be erected by the Hudson's Bay Company on Third street, Edmonton. The foundation and basement is of concrete and the upper storeys will be of brick. The company will install a lighting and heating plant to supply the store and warehouse. The building will be completed next year. Mr. Vaughn has charge.

Contractors and builders in Edmonton believe that the action of the newly organized Western Canada Civic and Industrial League at Regina, Sask., in urging legislation to abolish the granting of bonuses will have a wholesome effect upon prospective manufacturers. They say that legitimate manufacturing in the coast and prairie provinces will be aided by uniform legislation. The league will meet in Edmonton next year.

With public attention rivetted upon the war region in southern Europe it is of interest to learn that Messrs. Heenan & Froude, Limited, have just been awarded a contract for a destructor plant(capacity 40 tons daily) for the city of Turn Severin, Roumania, also a second contract for a refuse destructor plant (cap. 120 tons daily) for the city of Craiova, Roumania. The Canadian agents for the above firm are Messrs. Laurie & Lamb, Montreal.

Examinations for admission to the study of architecture or registration in the province of Quebec will be held on January 20, 1913, and following days, at the rooms of the Province of Quebec Association of Architects, No. 5 Beaver Hall Square, Montreal. Testimonies of study will have to be in the rooms of the association on or before December 20 next, accompanied by a fee of $10 for candidates for matriculation and a fee of $25 for registration.

A new 700-room hotel is to be erected on the east side of Bay street, Toronto, between Queen and Richmond streets. The property has a frontage of 210 feet on Bay street by 143 on the Queen and Richmond frontages. The total assessment is $570,708 on the land, and $54,125 on the buildings, a grand assessment total of $625,133. The price paid is $3000 a foot and $3,000,000 is expected to be spent on the construction and equipment of the hotel

The Metal Shingle & Siding Company has reorganized with $1,500,000 capital. In addition to taking over the A. B Ormsby Company of Toronto, the Metal Shingle & Siding Company have become associated with the United States Metal Products Company, and will introduce into Canada some new lines manufactured by this concern. The Metal Shingle & Siding Company will have seven factories in Canada, the Toronto one being known as the A. B. Ormsby branch of the Metal Shingle & Siding Company The directors of the consolidated company are Mr C Dolph, president; Mr A K. Cameron, vice president and general manager; Mr A B Ormsby, second vice president, Mr H C Randall of the United States Metal Products Company New York, and Mr J D Murdock, of Simcoe, Ontario

The Canadian Porcelain Company, Limited, has been incorporated, with a capital stock of $300,000, to manufacture vitrified white porcelain for electrical and other purposes They have purchased a 20 acre site at Hamilton, Ont., and will put up a plant, the first unit to cost $150,000. The buildings will be of steel and brick and will be ready for operation next spring. Messrs. George Alden, Chas. Palmer, of Rochester, and Fred. D. Palmer, of Galt, Ont., are the principal directors.

Messrs. John S. Metcalf Company, Limited, of Montreal, engineers and constructors of grain elevators, have designed a new 1,500,000 bu. reinforced concrete elevator for the Manchester Ship Canal Company, of Manchester, England. The contract for construction has been placed with Messrs. Henry Simon & Son, of Manchester. The elevator is designed on the American system and will have a large capacity for receiving grain in bulk, storing, sacking and shipping in sacks and in bulk. The cost will be about $900,000.

The Hamilton Building Inspector's annual report shows a remarkable growth in Hamilton this last year. Fifty firms have taken out permits for new factories or factory extensions to the value of $1,234,230. Twelve new factories with an invested capital of over two million dollars have located in the "Ambitious City" during the past year. The building permits to October 31st, 1912, are 1,356 in number and of a value of $5,011,800, showing an increase of 148 permits and a value of $1,127,170 over the same period last year.

A somewhat significant feature in connection with the opening of the present session of Parliament is the fact that in both the Commons and the Senate the first bill on the order paper for the consideration of the members is "An act respecting the pollution of navigable waters." The necessity for some form of legislation controlling the practice of dumping sewage into rivers has been most forcibly impressed upon the Premier during the past summer, owing to the typhoid epidemic which has raged at the capital.

The Montreal city council wants more power over the Light, Heat & Power Company in the matter of laying pipes. It is alleged that the company have ignored notices of intended work on streets sent by the city. When the latter had done a large part of the hard work the company's men appeared and started to lay the mains. Then the city, which is just starting to lay concrete, is faced with the necessity of either stopping the work or laying the concrete along the freshly filled in trench, with the certainty that this earth will later sink, leaving a hollow under the pavement in places throughout its whole length.

In the annual report, Mr. Alcide Chausse, superintendent of buildings, Montreal, emphasizes the fact that the permits issued do not show the real value of the total construction for the year, as there are certain exemptions for which no permits are required. These are estimated for 1911 at $3,425,000, making, with the permits issued, a total of $18,004,952. The revenue of the department during the year was $68,076 drawn from permits for buildings, water used for building materials, and licenses and permits for dangerous industries, theatres, moving picture halls, etc. This is an increase of $22,276.16 over the previous year.

The Manufacturers Harbor Terminals, Limited, organized recently at Montreal, for the purpose of constructing buildings on the sixteen acres purchased on the river front in Longue Pointe ward has decided to apply to the Dominion Parliament for a capitalization of eight million dollars as at first intended. Instead of building four of the large six-storey buildings at first proposed, it is now the intention to build five, as it is believed that this scheme of giving concentrated facilities of lighting, heating, elevator, rail, river and ocean will be enough to attract from twenty-five to thirty large manufacturers at once. Four of these buildings will be from four hundred to five hundred feet in length and about one hundred and fifty feet in width. There is twelve hundred feet of deep water frontage, and the property also faces on Notre Dame street east. Each of these buildings will have about 400,000 square feet floor space, which would make 2,000,000 square feet for the first five buildings designed. It is intended to commence on the first building in time to have it finished, if possible, by March, 1914.

Representatives of the most influential business organizations in Montreal have had a conference with the city members in the Quebec Legislature on the question of enlarging the powers of the Civic Board of Control. The present system was declared to be impracticable, and to be delaying the progress of the city. The speakers were unanimous in their objection to the present inefficient and wasteful procedure, and asked that all executive power should be vested in the Board of Control, and that the City Council should either be done away with or limited to legislative functions, and dealing with the annual budgets presented to them. Hon. J. Decarie promised to place the views before the Government.

In some respects the good roads policy of the Quebec Government has not met with the response expected. The Hon. P. S. G. MacKenzie, the provincial treasurer, in his budget speech stated that not nearly as much had been done under the law as was anticipated. The Government was authorized to raise $10,000,000, to be placed at the disposal of the municipalities, who would have to pay two per cent on the money advanced, the remaining two per cent. being found by the Government. The amount of the loans at present actually issued, said Mr. MacKenzie, was $112,000 and a further sum of $101,000 had been authorized, but not as yet issued. As foreshadowed by the Prime Minister, a measure would be submitted for the consideration of the House in amendment of the act, by which it would be provided that the Government shall assume the full amount of the loans, in principal and interest, reserving the right to collect from the municipalities directly the amount o their share of the interest. This would not have the effect of increasing the financial obligations of the province, but it would improve the character of the security in the eyes of the investors, as it would change it from a municipal to a direct Government obligation, and would remove any objection that investors might have as to the feature in the act of divided responsibility for the payment of the interest.

The National Hydro-electric Company have taken another step towards supplying Montreal with power from their proposed plant at Carillon Falls, P.Q. At present a small plant is in operation, but it is planned to build a very extensive installation, which Mr. Miles, the president of the company, states will cost ten million dollars and will be capable of developing 160,000 horse power. The small plant is to be used for the building of the larger one, and also to supply the neighboring municipalities. The company have a Dominion charter, enabling business to be done in the province, and application has now been made to the Provincial Legislature to give them the right of placing poles and wires in municipalities without dealing with each one in particular. Power is sought to use the Montreal conduits for the company's transmission wires, while, pending the construction of the conduits it is asked that rights for poles and wires be granted. A clause provides for the consent of the city of Westmount being granted before making use of the city thoroughfares, but the municipality must allow a transmission line to reach other places. As to the territory the company asks to be permitted to operate in, the petition mentions Assomption, Terrebonne, Two Mountains, Jacques Cartier, Laval, Montcalm, Joliette, Berthier, Richilieu, Missisquoi, Vaudreuil, Argenteuil, Soulanges, Chambly, Chateauguay, Beauharnois, Ottawa, Iberville, St. John and Labelle. The first issue of bonds and debentures is $12,000,000.

Canadian Railroad Development

It is announced that Messrs. Mackenzie & Mann have perchased the charter of the London and North-Western Railway and already have engineers going over the proposed right-of-way which will run from London to Sarnia, through Lobo, Arkona, Warwick and Plympton townships.

As a result of representations made to Hon. W. T. Crothers, Minister of Labor, that conditions in the construction camps along the Canadian Northern Railway main line at Nipigon, and along the Grand Trunk Pacific in British Columbia were far from satisfactory, the minister has sent officials to investigate conditions at these camps and has promised to look into this matter at once.

Mr. J. D. McArthur, the contractor for the Hudson Bay Railway, recently paid a visit to the Minister of Railways at Ottawa and reported that work was being rushed on the Hudson Bay line and that it was expected to have the whole work complete by 1914, the time allowed for the construction of the road. Already the grading has been done for a distance of sixty-five miles. Supplies and equipment for the construction camps are being taken into the country this fall and construction work will proceed on an extensive scale next summer.

Recent developments in connection with the construction and temporary operation of the National Transcontinental railway indicate that another step has been taken toward the realization of the scheme of government ownership. In addition to commencing a temporary service this autumn from Moncton to Levis over the completed eastern section of road, the announcement is now made that a temporary service will be inaugurated shortly under the direction of the Transcontinental Commission over other completed sections of the line east and west of Cochrane, and from Quebec to a short distance west of La Tuque. Major Leonard, Chairman of the Commission, states that the Commission is prepared to operate any and all portions of the road, where the contractors are not giving a service. The whole Trans-Superior Junction section is taken possession of by the government. It is now being operated by the Grand Trunk Pacific under a lease, the company simply having running rights over it. From Superior Junction to Cochrane the steel is almost entirely laid and probably will be all laid by December. Labor troubles accentuated by the Balkan war delayed the contractors, otherwise the rails would probably have been all down by this time. Though almost finished, however, Major Leonard states that passenger trains and big freight trains will not run over it till the autumn of 1913.

Personal Mention

Mr. George Craddock, for fifty years an architect in London, Ont., died there recently, aged 82 years.

City Engineer Macallum, of Hamilton, Ont., who recently attended a convention of municipal engineers at Dallas, Texas, was elected a vice-president of the society.

Mr. Th. Seidl, formerly in charge of the Engineering Department of the London office of Messrs. Escher Wyss & Company, Limited, has been appointed to take charge of the Canadian head office of that company vice Mr. Thv. Heyerdahl, who is leaving Canada at the end of the present year.

In the death of John Clifford, at the age of sixty-nine, which occurred at the Hotel Dieu, the city of Windsor, Ont., loses one of its most striking and original characters and professional men. In addition to other public works, Mr. Clifford designed the plans for the present Chicago City Hall, and old City Hall in San Francisco. Mr. Clifford came to Windsor to reside several years ago. He was of Irish birth and was unmarried.

Mr. Robert T. Hopper, the president of the Dominion Marble Company, South Stukley, P.Q., has died at his Montreal residence, aged 54. For a long time he was in bad health, and lately returned from a sanitorium at Battle Creek, Mich. Mr. Hopper was a prominent business man, a pioneer in the cement trade, and a promoter of the asbestos industry. He took up cement in the early days, and when many were sceptical as to its utility he founded the Portland Cement Company, of Marlbank, Ontario, which was later transferred into the Beaver Portland Cement Company and has since been merged into the Canada Cement Company. He was a director of the Sherbrooke Light and Power Company, a member of the Canadian Mining Institute and was associated with very many different business companies. Mr. T. Jackson Hopper, his son, is secretary-treasurer of the Dominion Marble Company.

The Tripure Still in Canada

In these days, when so few communities can boast of pure water supplies, the matter of water purification is a most important consideration for the manufacturer and the employer. The announcement, therefore, that the Tripure Water Company have come to Canada and are prepared to take orders for the installation of their Tripure Stills cannot fail to be received with special interest. This company has installed its apparatus in many large institutions of the United States, where they have won an enviable reputation. The principle on which the apparatus works is claimed to be entirely different from that of any other still or filter on the market. The Tripure Still produces a water entirely devoid of that flatness of taste generally associated with distilled waters. This is accounted for by the fact that oxygen is introduced into the vapor prior to condensation. An additional argument in favor of the Tripure Still is that it can be attached to an ordinary steam heating coil (this furnishing all the heat that is necessary) and by running through the Still whatever water may be available the product is a perfectly pure water that will pass any chemical test.

It is worthy of special note that the United States Government is using Tripure Stills throughout all its departments, as well as in the army and navy. The industrial users include the General Electric Company, the George Westinghouse Company, Colgate Soap Company, the New York Telephone Company, the Hudnut Perfume Company, and the Gimball Departmental Stores. The polluted sea water of New York Harbor is made pure by this system and is actually used by the health officer in preference to the water supplied from Staten Island.

Full particulars with descriptive pamphlets will be furnished prospective Canadian users by the Sanitary Water Still Company, 269 King street west, Toronto.

Beatty hoists (manufactured by M. Beatty & Sons, Limited, Welland, Ont.) are the subject of an attractive bulletin just received. This publication is issued pending the compilation and printing of a new catalogue covering the entire output of the Beatty firm. The bulletin is well illustrated and contains detailed descriptions of the company's hoisting engines, centrifugal pumps, derricks, dredges, scows and clamshell buckets. Copies may be obtained on application to Messrs. Beatty & Sons.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Berlin, Ont.

Trunk sewer to cost $75,000. Mayor, W H Schmalz. Clerk, A. H. Millar. Engineer Johnston is preparing plans.

Burnaby, B.C.

Roads, &c., contemplated by Town Council. By-law providing for raising $250,000 for roads and $50,000 for sidewalks was recently passed.

Dunnville, Ont.

Turbine pump for domestic and fire protection. Chairman Water Commissioners, B. L. Edgecombe. Supt., A. M. Jackson. Time for receiving tenders is extended from the 18th inst. to the 28th.

Edmonton, Alta.

Paving planned by City Commissioners. Clerk, F. M. Crosskill. 400,000 sq. yds. of asphalt and bitulithic pavement. Tenders will be received until Dec. 10. Plans, specifications, etc., at office of engineer, A. J. Latornell.

Lake Megantic, Que.

Road improvements are under consideration. Engineer in charge, Govt. engineer. Town council have received a grant of $40,000 from the Prov. Govt. Work to start in spring.

Montreal, Que.

Sewers. Sec., L. N. Senecal. Tenders received by Board of Commissioners, City Hall, until No. 28th for construction of sewers on Cedar avenue and Cote des Neiges road.

New Hamburg, Ont.

By-law passed to provide for road improvement to cost $10,000. Clerk, David Eby. Work to begin in spring. Plans as to system to be adopted not yet fully matured.

Niagara Falls, Ont.

Pavements. Engineer J. C. Gardner has been instructed to prepare plans and specifications for 21,000 yds. brick pavement on Victoria avenue. Clerk, W. J. Seymour.

Sewer under contemplation. Clerk, W. J. Seymour. Engineer, J. C. Gardner. By-law will be submitted to build 6000 ft of 60-in. sewer.

North Toronto, Ont.

By-law passed providing for additional water mains. Secretary, H. C. Norman.

Strassburg, Sask.

Construction of sidewalks is under the consideration of the town council. Clerk, J W Lauman

Winnipeg, Man.

Well drilling machine required by Bd. of Control Engineer, H. N. Ruttan, 223 James avenue. Specifications at engineer's office. Tenders received by secretary M. Peterson until Dec. 8nd.

Water supply wells and pumps under contemplation for the Municipality of St. Boniface. Clerk, J. B. Cote. Engineer, M. P. Blair. 3 deep wells for city water supply with necessary electrically driven pumping machinery.

Sewers on Alfred, McDermot and Godfrey streets. Specifications at office of engineer, H. N. Ruttan, 223 James ave. Tenders received by secretary of Board of Control, M. Peterson, until Nov. 29.

Water mains on Magnus and Lawrence street. Specifications at office of engineer. Tenders received by secretary until Nov. 28. Engineer, H. N. Ruttan, 223 James avenue. Board of Control. Sec., M. Peterson.

CONTRACTS AWARDED

Point Grey, B.C.

Paving to cost $10,970 (Marine Drive). Clerk, G. C. Heighway. General contractors, Guinan & Prescott.

St. John, N.B.

Watermain (De Mont St.) Commissioner Water & Sewage, R. Wigmore. Engineer in charge, Wm. Murdock, City Hall. General contractors, Moses & Steeves, 36 Brunswick street.

Winnipeg, Man.

Sewers. Contract was awarded to Henry Martin, 620 Redwood avenue, for sewers in Carlaw avenue from Wentworth to Lilac, and to the Dominion Construction Co., 290 Selkirk avenue, for sewer in Monkman street from Bannatyne to 1st lane north. Board of control. Sec., M. Peterson. Engineer, H. N. Ruttan, 223 James avenue.

Railroads, Bridges and Wharves

Assiniboia, Man.

Bridge planned, Conway street, by Town Council. Sec.-treas., Frank Ness, Kirkfield Park P. O. Steel traffic bridge 500 ft. x 26 ft. with 6 in. walk on both sides over Assiniboine River. Engineer is preparing estimates. By-law to be submitted Dec. 17, 1912.

Beachville, Ont.

G. T. Ry. Co. have been authorized to construct siding for the Standard White Lime Co., Ltd., on Lot 18, Con. 2, Twp. of North Oxford, near Beachville.

Calgary, Alta.

Spur. C. P. Ry. Co. has been authorized to construct spur for the McPherson Fruit Co.

C. P. Ry. Co. has been authorized to construct spur for the Neilson Furniture Co. Ltd.

Cardinal, Ont.

G. T. Ry. Co. have been directed to construct subway at highway leading to Cardinal.

Twp. Crowland, Ont.

G. T. Ry. Co. has been authorized to construct siding for the Canadian Billings & Spencer Ltd., Lot 23, Con. 4, Twp. of Crowland, Welland, Ont.

Duff, Sask.

G. T. P. Branch Lines Co.'s location of station at Duff, Sask., on its Melville-Regina Branch has been approved.

Dufferin, Que.

The James Bay & Eastern Ry. Co.'s location of station at Dufferin, Twp. Dufferin, Que., mileage 30.7 from Roberval has been approved.

Edmonton, Alta.

Street railway extension. Clerk, F. M. C. Crosskill. Engineer, A. J. Latornell. Ry. Inspector, Jno. Moir has submitted preliminary plans for extension to belt line system. 110 miles of lines are provided for, 280 cars are expected to be operated.

Fitzroy Harbour, Ont.

C. N. O. Ry. Co.'s location of station at Fitzroy Harbor, Twp. Fitzroy, Co. Carleton, has been approved.

Ft. William, Ont.

Street railway material. Tenders received by Constr. Supt. A. L. Farquharson for supply of steel, angl bars, spikes, bolts, cedar poles, ties, trolley wire, overhead material. Form of tender and particulars can be had at office of superintendent.

Frobisher, Sask.

G. T. P. Branch Lines Co.'s location of station at Frobisher on the Regina Boundary Branch has been approved.

Hamilton, Ont.

Street railway belt line is under the consideration of the city council to be operated with hydro-electric power. Mayor, Geo. H. Lees.

Medicine Hat, Alta.

C. P. Ry. Co. have been authorized to construct spur for J. H. Preston Planing Mills Co.

Oshawa, Ont.

C. L. O. & W. Railway Co. have been authorized to construct bridge at mileage 159.3 at Oshawa.

Ottawa, Ont.

Machinery for 3½-yd. Dipper dredge required by the Dom. Govt., Dept. Public Works. Sec., R. C. Desrochers, Ottawa. Tenders will be called shortly.

Providence Bay, Manitoulin Island, Ont.

Extension to wharf planned by Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders will be called shortly.

Quaco, N.B.

Wharf planned by the Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders will be called shortly.

Quebec, Que.

Harbor improvements planned for Dom. Govt., Dept. of Public Works.

Sec., R. C. Desrochers, Ottawa. Tenders will be called shortly.

Rossland, B.C.
Station and Detention House planned. G. N. Ry. Co.'s location and plans of proposed buildings have been approved.

St. Peters Bay, P.E.I.
Repairs to wharf planned by Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders will be called shortly.

Saskatchewan
Branch railroad. C. N. Ry. Co. have been authorized to construct across 38 highways on its Thunderhill Branch.

Severn Falls, Ont.
C. P. Ry. Co.'s location of station at Severn Falls on Lot 22, Con. 7, Twp. of Matchedash, Co. Simcoe, has been approved.

Trenton, Ont.
C. L. O. & W. Ry Co. (C. P. R.), have been authorized to construct bridge across Ontario street and C. N. Railway's spur.

Ville-Marie, Que.
Public wharf planned for Dom. Govt., Dept. Public Works. Sec., R. C. Desrochers, Ottawa. Tenders will be called shortly.

Winnipeg, Man.
Bridge to cost $600,000, 66 ft. wide. St. Boniface (Provencher avenue). Clerk, J. B. Cote. Engineer, H. N. Ruttan, 223 James avenue. Plans are being prepared for substructure. Tenders will be called about Dec. 31.

CONTRACTS AWARDED

St. John, N.B.
Wharf to cost $185,000 for Dom. Govt. Dept. Marine & Fisheries. Deputy Minister, Alex. Johnston, Ottawa. General contractor, Frank L. Boone, St. Mary's Ferry, York County, N.B. Cribwork and concrete construction.

Toronto, Ont.
Canadian Supply Company, 220 King street west, have been awarded the contract for roofing and metal work for the new C. P. R. terminals here. Canadian Stewart Co., Montreal, Que., are the general contractors.

Vancouver, B.C.
Pier (foot Granville St.) for C. P. Ry. General contractors, Westinghouse, Church & Kern, East Calgary, Alta. Double deck construction; offices on 2nd floor, and warehouses below. An overhead bridge will be constructed.

Public Building, Churches, Schools, etc.

Avonmore, Ont.
School. Tenders received by Sec.-treas., A. O. Miller, until Dec. 6th. Plans and specifications at offices of C. P. Meredith, architect, 126 Sparks street, Ottawa, and Sec.-treas., Avonmore.

Brampton, Ont.
School to cost $35,000. Architects, Ellis & Connery, Manning Chambers, Toronto. 2-sty., 10 rooms, brick foundation and structural steel construction. Plans drawn.

Post Office under consideration of the Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. The Commercial Bureau has petitioned the Dominion House for a new Post Office.

Charlottetown, P.E.I.
Alterations to Police and Fire Stations. Clerk, W. W. Clarke. City engineer, Jno. P. Nicholson. Tenders will be called about January 1, 1913. Concrete floors, lavatories, open plumbing, 3 steel cells, fire-places, steam heating, ventilating system. Address communications to City Clerk.

Davidson, Sask.
Hospital, cost $11,000, planned by the Town Council. Clerk, A. J. Robertson. Basement in. Other contracts not awarded until spring.

East Angus, Que.
School to cost $10,000 planned for R. C. School Commissioners. Present building will be sold and new one erected next spring.

Grand Mere, Que.
Public building under consideration of the Dom. Govt., Dept. public Works. Sec., R. C. Desrochers, Ottawa. Tenders will be called shortly.

Hamilton, Ont.
Central Fire Station planned by City Council. Mayor, Geo. H. Lees. Architect, Stewart & Witton, 2 Hughson St. S. Ratepayers will vote on by-law Jonuary 1st to raise $30,000 to complete new building.

Niagara Falls, Ont.
Hospital addition to cost $11,000 planned for The Welland County Hospital Trust. Chairman, J. F. Gross. Architects, Langley & Howland, Continental Life Bldg., Toronto, Ont. A committee has been formed to report on advisability of adding a wing to the hospital.

Ottawa, Ont.
Stores and offices, cost $35,000, for S. Diamend, 47 By Ward Market. Five storeys, solid brick construction. Plans in progress.

Peterboro, Ont.
Garbage incinerator to cost $10,000 under contemplation of the Town Council. Engineer, T. A. S. Hay. Ratepayers will be asked to vote on by-law Jan. 1, 1913.

Quebec, Que.
Addition to drill hall planned by the Dom Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders will be called shortly.

Rock Island, Que.
Fittings for Post Office, Customs and Inland Revenue Office. Dom. Govt., Department of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders received by secretary until Dec. 2. Plans at office of Jas. Lowell, Rock Island; H. N. Lymburner, Supt. of Bldgs., Montreal, and Dept., Ottawa.

St. John, N.B.
Market building is contemplated by the City Council, c/o Commr. of Pub. Safety, H. R. McLellan. Tungsten electric lighting system to be installed. Plans will be prepared.

Saskatoon, Sask.
Forest Nursery Station planned for Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders will be called shortly.

Sherbrooke, Que.
High School for Board of School Commissioners. Architect, H. G. James, 4 Magog street, is preparing plans. 3-sty., 60 x 50.

Simcoe, Ont.
Remodelling Collegiate. Architects, Stewart & Witton, 2 Hughson street S., Hamilton. School Board will ask Town Council to submit by-law on January 1st providing $50,000 for the work.

Toronto, Ont.
Old Folks Home, cost $25,000, Industrial Farm. Mayor, H. C. Hocken. Architect, City Architect, City Hall. Plans in progress.

It is proposed by the Loew Interests to add a theatre in this city to their circuit. Address Marcus Loew, Loew Bldg., New York.

Jail buildings (Industrial Farm). Mayor, H. C. Hocken. Architect, City Architect, City Hall. Plans for heating plant are under consideration.

Public lavatory to cost $10,000 (Dundas street and Lansdowne avenue) is under consideration. Mayor, H. C. Hocken. Architect, City Architect, City Hall.

School, cost $60,000, Pauline avenue. Secretary, Board of Education, W. C. Wilkinson, City Hall. Architect, F. E. Belfry, City Hall. Tenders received by sec.-treas. until Nov. 29th. Plumbing, ventilating, heat regulation and wiring.

Theatre and offices to cost $12,000 (St. Clair and Dufferin street) for R. Bradshaw, 25 Wellington street west. Architect, P. H. Finney, 79 Adelaide St. E. 2-sty., 36 x 120, brick and tile construction, brick foundation. Plans in progress.

School, cost $60,000, Keele and Conduit streets. Sec.-treas. Board of Education, W. C. Wilkinson, City Hall. Architect, F. E. Belfry, City Hall. Tenders received until Nov. 29th for masonry and steel, carpentry, plastering, painting, roofing, tinsmithing, fireproof flooring, iron stairs.

Vancouver, B.C.
Theatre to cost $250,000, Richards St., for Klaw & Erlanger. Representative, G. J. McKenzie, Seattle, Wash. Reinforced concrete construction. Plans prepared.

Improvements to bath house planned by City Council. Clerk, Wm. McQueen. Locker accommodation will be changed. Laundries, drying rooms and store rooms will be built. Plans will be drawn at once.

Vernon, B.C.
School, 4 rooms, brick or concrete to admit of addition of 4 rooms later. Particulars from F. D. Rolston. Competition open till Dec. 10, 1912. Sec., Fred D. Rolston.

Wetaskiwin, Alta.
Post Office fittings. Dom. Govt., Department of Public Works. Sec., R. C. Desrochers, Ottawa. Plans, specifications, etc., at Dept. and at offices of B. Miller, Clerk of Works, Wetaskiwin, J. G. Manson, Clerk of Works, Edmonton. Specifications also at office of MacLean Daily Reports, Toronto. Tenders received by Sec. until Dec. 9th.

Winnipeg, Man.
Weigh scales building to be erected in City Yards, Elmwood. Engineer, H.

A. Ruttan, 22 James avenue. Contract was awarded to J. W. Astley. M. Petersen, Sec. Board of Control.

Armory, Maryland street. Dominion Government, Dept. of Public Works, Secretary, R. C. Desrochers, Ottawa. Architects, Pratt & Ross, 289 Garry St. The 34th Fort Garry Horse Regiment have secured the old two-storey Carson Creamery which will be remodelled for armory. One storey will be added and interior changed. Adjutant E. M. Fisher c/o Allen, Killam & McKay, 364 Main St.

CONTRACTS AWARDED

Gananoque, Ont.

Post Office to cost $29,973. Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, E. A. Blakely. Heating and plumbing, W. F. Martin.

Armory to cost $14,000. Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractors, Byers & Anglin, 65 Victoria street, Mtl. Roofing, J. W. Bennett & Son.

Post Office to cost $29,973 (King). Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, E. A. Blakely. Heating and plumbing, W. F. Martin.

Hamilton, Ont.

Warehouse, cost $6,000, for Chas. E. Marks, 93 John St. N. Architect, R. Clochey, 226 John street S. General contractors, Mitchell & Riddell, 91 Peter St. Carpenter, John Ennis, 237 Hunter street W. Two storeys and basement, concrete foundation, brick construction.

Kincardine, Ont.

Armory planned by Dom. Govt., Dept. Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, Jno. Mills. 2-sty., 45 x 90, concrete foundation, brick construction. Excavation started.

Montreal, Que.

Alterations to Club to cost $10,800 (179-181 Dorchester W.) for Milton Hersey, 117 St. James street. Architect, Prof. Ludlow, McGill College avenue. General contractor, W. B. Laird, 18 McGill College avenue. 3-sty., 55 x 76, stone foundation, brick construction.

Sackville, N.B.

Steam laundry. Owner and builder, L. C. Carey. Architect, Prof. J. W. Crowell. Two storeys, 65 x 38, brick or concrete block construction. Upper storeys to be used for tenements. Building to be constructed in spring.

St. Andrews, N.B.

Amusement Hall for C. P. Ry. head office, Montreal. Hotel Supt., Hayter Reid. General contractors, P. Lyall & Sons Construction Co., St. Andrews. 2-sty.

Sherbrooke, Que.

Church to cost $30,000 for St. Patricks Congregation. Architect, L. N. Audit. Warden, R. Kelly. General contractors, Lefebure & Bonin, King St. 1-sty., 50 x 100.

Armory to cost $28,000. Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. General contractor, Loomis Dakin Ltd. Iron and steel, Jenckes Machine Co. Hardwood floors, fixtures, etc., required.

Toronto, Ont.

Theatre to cost $9,000 (Bloor and St. Clarens avenue) for S. Bloom & Co., 978 Queen W. Architects, Redmond & Beggs, Kent Bldg. General contractors, Bell Bros., 39 Howard Park avenue. Brick foundation, brick and structural steel construction.

Winnipeg, Man.

Church (Maryland avenue) for St. Mathews Congregational Church. General contractors, Pattison & Eilbeck, 506 Furby street. Brick construction.

Warehouse, cost $13,000, Pine, for Prairie City Oil Co., 437 Somerset Bldg. Portage ave. Architect and general contractor, J. M. McDiarmid, Canada Bldg. Two storeys, 50 x 140, cement foundation, brick construction.

Business Buildings and Industrial Plants

Caledonia, Ont.

Remodelling gypsum plant for The Caledonia Gypsum Co. Pres., James Old. Sec., E. J. Hunter. Electric Power & Light Service to be installed. Plans in progress.

Cayuga, Ont.

Show room, garage and machine shop, Tolbert street, for Peter Richald, Fisherville. 2-sty., cement and iron construction. Plans in progress.

Chamcock, N.B.

Warehouse for Canadian Sardine Co. Director, F. P. McColl. Plans in progress.

Edmonton, Alta.

Bank building for the Quebec Bank, head office Quebec, Que. Site has been purchased on Jasper avenue and plans will be prepared.

Warehouse and offices for the Canadian General Electric Co., Toronto, Ont. General manager, Frederick Nicholls. Site has been purchased in Fourth ave. and plans will be prepared.

Alterations and additions to hotel, (Namayo Ave.) for R. E. Noble (of Ottawa) c/o The Northern Hotel. Addition of 75 ft. in rear and 2 storeys to the entire building. Plans will be prepared.

Warehouse is planned for the Massey-Harris Co. Pres., Hon. L. Melvin Jones, Toronto, Ont. 6-sty. and basement, 200 x 150. Site has been purchased at cor. of Sixth street and Namayo avenue.

Hamilton, Ont.

Addition to factory contemplated for Canada Screw Co., 134 Wellington St. N. Manager, J. Orr Callaghan. Architects, Mills & Hutton, Bank of Hamilton Bldg. are preparing plans for further extensions to be made next spring.

Montreal, Que.

Stores and Loft Building (cor. St. Lawrence and Mt. Royal) for J. A. Davis & Co., Ltd., Dominion Express Bldg. 10-sty., 210 x 68. Plans in progress.

New Westminster, B.C.

Office building to cost $100,000 (6th street). Architects, Gardiner & Mercer, Westminster Trust Bldg. 6-sty., 60 x 132, reinforced concrete construction. Only 3 storeys will be erected at present. Plans in progress.

Ottawa, Ont.

Bread factory contemplated for The Ottawa Bread Bakery, Ltd. Promoter, Ed. Cushing, 3 Thornton. Plans will be prepared.

Alterations and addition to boat house to cost $5,000, for Ottawa Canoe Club, Rockcliffe. Architect, C. P. Meredith, Sparks street. Large quantity of steel work required. Plans prepared.

Shop and residence to cost $5,500. Somerset, for P. J. Nolan, 673 Wellington street. Architect, A. Tracey, Gladstone. 2-sty., 25 x 60, cement foundation, brick veneer construction. Plans in progress.

St. Catharines, Ont.

Alterations to malt house (Brewery street) for Taylor & Bate. Concrete foundation, reinforced concrete construction. Company's architect and engineer is preparing plans.

Sherbrooke, Que.

Office and factory, Wellington street, for The Ry. Asbestos Packing Co. Sec.-treas., E. C. Gatien. Plans ready. Contract will not be awarded until spring. 1-sty., 30 x 84.

Toronto, Ont.

Factory planned for M. Rosin, 456 Richmond street W. Architect, J. M. Cowan, 65 Adelaide E. 2-sty., 99 x 28 ft. 5 in., brick foundation and construction. Tenders to be called shortly.

Store and apartments to cost $15,000, for J. Becker, Gladstone street. Architect, J. A. Harvey, 164 Bay street. Brick foundation, artificial stone and brick construction. Plans drawn.

Vancouver, B.C.

Store and apartment building for Mr. Pierce, Collingwood street east. Architect, W. E. Goodfellow, 303 Hastings W. Two storeys, 50 x 70, frame construction. Tenders called.

Hotel, cost $150,000, Hastings street E. Architect, Emil Guenther, North West Trust Bldg. Ten storeys, 50 x 100, structural steel, brick and terra cotta construction. Plans in progress.

Warehouse to cost $36,000, Water St., for Mrs. Montgomery. Architect, H. B. Watson, 16 Hastings E. 6-sty., brick and mill construction. To be used for wholesale business purposes. Plan ready.

Garage, cost $8,000, Venables street, for W. H. Patterson, 1744 7th ave. east. Architect, W. E. Goodfellow, 1744 Hastings street west. Two storeys, 33 x 100, reinforced concrete. Tenders called.

Victoria, B.C.

Office building planned for McCutcheon Bros. Site has been purchased adjoining Carnegie Library on which a ten-storey modern fireproof building will be erected.

CONTRACTS AWARDED

Brantford, Ont.

Ice house, Grey street, for Brant Creamery. Builder, Chas. W. Sill. One storey, 30 ft. high, 30 x 30, frame, double sheeted covered with iron. Work to start at once.

Calgary, Alta.

Addition to block, cost $7,000, for Mrs. Robinet, 18th ave. west. Builder and general contractor, A. A. Rose, David Block. Two storey addition, cement foundation, brick construction.

Store and residence, cost $4,000, Sixth ave. east, for A. S. Whiting Boker, Bix 1100. Builder and general contractor, D. Engleman, 525 75th ave. N.E. Two sty., 25 x 45, cement foundation, brick construction. Excavating started.

Warehouse and offices, cost $20,000, Manchester, for Canadian Stock Food Co. Architects, Lang & Major, Board of Trade Bldg. General contractors, McNeil & Trainer, Box 14. One storey, 42 x 100, brick construction, cement foundation.

Charlottetown, P.E.I.

Remodelling store, cost $7,000, for Moore & McLeod, Queen street. Architect, C. B. Chappell. General contractors, H. & S. Lowe. Store fronts, plate glass, fixtures.

Gananoque, Ont.

Barn and silo, cost $75,000, Maple Croft Farm, for W. S. McDonald. Architects and general contractors, Byers & Anglin, 65 Victoria street, Montreal. Two storeys, concrete floors.

Montreal, Que.

Store and residence, cost $6,000, for Victor Decary, 2356 Notre Dame West. General contractor, H. Aubertin, 76 Fourth ave., Maisonneuve. Three stys., 26 x 35, stone foundation and construction.

Storage, cost $6,000, Huntley. Owner and general contractor, E. L. Baugh, 2 Place d'Armes Sq. One storey, 160 x 66, cement foundation, stone construction. Excavating started.

Store and residence, cost $8,400. Owner and builder, E. Ladouceur, 2735 St. Hubert. Three storeys, 60 x 50, cement foundation, brick veneer construction. Excavating started.

Addition to store, cost $4,500, 176 St. Denis, for Madame Lucien Huot, Belosil, Que. General contractor, Alf. Mercure, 419 Labrecque. One storey, 43 x 36, stone foundation, brick veneer construction.

Office building, cost $700,000, St. Catherine and Bleury streets, for Belgo-Canadian Realty Co., Transportation Bldg. Architects, Finley & Spence, 46 Beaver Hall Hill. General contractors, Peter Lyall & Sons Construction Co., Transportation Bldg. Six storeys, 127½ x 354, cement foundation, terra cotta, fireproof and brick construction.

Store and residence, cost $3,000, for Felix Gucheret, 3343 St. Andre. Builder, Eugene Franche. Two storeys, 25 x 32, cement foundation, brick construction.

Niagara Falls, Ont.

Printing factory, cost $5,000, for F. H. Leslie, c/o "The Review," Erie avenue. Architect, J. V. Collins, Queen street. General contractors, R. Smith & Son. Two storeys, 50 x 50, brick construction, concrete foundation. Plumbing and heating contracts not yet awarded. Old building is being wrecked.

Ottawa, Ont.

Shops, cost $11,000, Bank street, for E. W. Borbridge, 185 Albert street. D. Younghusband, 339 Elgin. F. W. Howe, 63 3rd ave. Architect, J. A. Ewart, Sparks street. General contractor, J. B. Younghusband, 6 Spruce street. 55 x 60, cement foundation, solid brick construction.

Quebec, Que.

Tobacco factory, cost $35,000, Gignoc, for Rock City Tobacco Co. Architects, Talbot & Dionne. General contractors, J. Villeneuve & Fils. Iron and steel, Eastern Canada Steel & Iron Works, 508 Coristine Bldg., Montreal. Roofing, N. Barbeau. Painting, Marier & Tremblay. Heating, plumbing and electrical work, P. P. Giguere & Cie. Six storeys, stone foundation, brick and structural steel construction. High pressure piping, engines, belting, pumps.

Regina, Sask.

Stores, cost $14,000, for Sheriff A. B. Cook, Douglas Park. Architects, Storey & Van Egmond, Credit Foncier Bldg. General contractors, The Parsons Building Co., Scarth street. One storey and basement, 60 x 80. Excavating started.

St. Andrews, N.B.

Addition to hotel, cost $25,000, Algonquin Hotel, for Canadian Pacific Railway Co., c/o Hayter Reid, Hotel Superintendent. General contractors, P. Lyall & Sons, St. Andrews. Three storeys, concrete construction, hexagon tower to dining room.

St. Catharines, Ont.

Warehouse, cost $5,000, rear 38 King street, for Chas. Taylor, 38 King street. Architect, A. E. Nicholson, 46 Queen St. General contractor, E. C. Nicholson, 43 George street. Excavation and masonry, Rymer Bros. Two storeys, 70 x 70, concrete foundation, brick and steel construction.

Sault Ste. Marie, Ont.

Barker manufacturing plant, cost $10,000, for The Green Bay Barker Co. General contractors, McPhail & Wright. 1 storey, 60 x 80, frame construction. Foundations in.

Sherbrooke, Que.

Store and offices, cost $70,000, Wellington street, for Quebec Central Railway. Architects, Cox & Amos, 112 Mansfield street, Montreal. General contractors, D. G. Loomis & Sons. Iron and steel, Jenckes Machine Co., Sherbrooke. Four storeys, 50 x 70, brick and stone construction.

Sydney, N. S.

Car factory for Cape Breton Electric Co., Ltd. Manager, F. L. Milliken. All necessary machinery required. Plans in progress.

Toronto, Ont.

Hotel, cost $2,000,000, is under consideration, King street west, by Ernest McConkey, King street west. Architects, Warren & Wetmore, New York. Twelve storeys, 90 x 212, structural steel, brick, tile, terra cotta and marble construction.

Two stores, cost $5,000, Bloor street west, for A. A. Barthlemes, 373 Keele street. Architect, J. A. Harvey, 161 Bay street. General contractor, J. J. Miller, 23 Perth ave. Two storeys, brick construction.

Warehouse, cost $11,000, Stafford & Defoe streets, for F. R. Cowan (in trust) 202 Crawford street. Builder, Thos. Essery, Elliot House. Three storeys and basement, brick foundation, brick and mill construction.

Four stores and residences, cost $15,000, 1161-7 Bloor street, for Thos. McLaughlin, 9 Bedford road. Builders, Davis & Moore, 176 St. Clarens ave. 2 storeys, cut stone and brick construction.

Garage and repair shop, cost $15,000. Owner and builder, Standard Garage, Ltd., 161 Oak street. Two storeys, 112 x 84, cement foundation, brick construction, concrete floors.

Factory, cost $60,000, for J. H. Keens, 46 Richmond street west. General contractors, W. Davidson & Co., 188 Duke street. Brick mill construction.

Garage, cost $2,500, for Dovercourt Land, Building & Savings Co., Adelaide and Victoria streets. Architects, Chadwick & Beckett, 18 Toronto street. Masonry, Teagle & Sons, 55 Boswell ave. Carpentry, W. E. Wakelin, 184 Van Horne street. Roofing, W. Davis & Co., 172 MacPherson ave. Painting, F. J. Cox, 921 Yonge street. Heating, Jos. Harrison, 557 Palmerston ave. Plumbing, A. F. Passmore, 428 Yonge street. Electric work, C. S. Anderson & Co., 332 Montrose ave. Tank, S. F. Bower & Co., 66-8 Fraser ave.

Warehouse, cost $35,000, Adelaide & Peter streets, for S. Fremes & Co., 62 Lombard street. Architects, Langley & Howland, Continental Life Bldg. Carpenter, Geo. Robertson, 230 Arthru St. Plumbing and heating, A. Welch & Son, 304 Queen street west. Six storeys.

Warehouse, cost $40,000, Adelaide St. W., for Boeckh Estate. Architects, Burke, Horwood & White, 28 Toronto street. Builders, T. Cannon & Sons, 75 Brock ave. Carpenters, Munro & Son, 76 Spadina ave. Roofing, H. Williams & Co., 23 Toronto street. Heating and plumbing, Purd. Manselly 63 Albert St. Electric wiring, Bennett & Wright, 72 Queen street. Plastering, Duckworth Bros., 119 Huron street. Painting and glass, F. G. Roberts & Co., 256 George street. Elevator, Otis-Fensom Elevator Co., Traders Bank Bldg. Structural steel, MacGregor & McIntyre, 73 Pearl street.

Vancouver, B.C.

Cold storage plant, cost $65,000, Richards and Pacific streets, for The British Canadian Securities Limited, Dominion Trust Building. Architect, Thos. Hooper, Winch Bldg. General contractors, The Norton Griffith Steel Construction Co., Dominion Trust Bldg. Two storeys, and basement, 100 x 300, reinforced concrete construction.

Stores and apartments, cost $45,000, for J. Jervis. Architects, Doctor Stewart & Davie, Arts & Crafts Bldg. General contractors, Campbell & Wilkie, 615 Pender street west. Three storeys, 66 x 100.

Winnipeg, Man.

Stables, cost $1,500, Logan ave., for Imperial Oil Co., Somerset Block, Portage ave. Architect and general contractor, Jas. McDiarmid, Canada Building, Winnipeg. Two storeys, 32 x 44, brick foundation, brick construction.

Office building, cost $150,000, Notre Dame E., for Notre Dame Investment Co., Keewayden Bldg. Architect, G. W. Nortwood, 232 Portage ave. General contractors, J. McDiarmid Co., Canada Bldg. Eight storeys, felt and gravel roofing, marble and oak finish.

Factory, cost $5,000, Tweed. Owner and general contractor, Canadian Metal Shelter Co., Elmwood, Winnipeg. One storey, 56 x 96, frame and metal construction.

(Continued on page 93)

Tenders and For Sale Department

Debentures for Sale

The Corporation of the Town of Steelton will receive offers up to 8 o'clock p.m., **December 3rd, 1912**, for the purchase of the following debentures:

$7,000 Public School Debentures.

$9,000 for the purchase of property for park purposes.

$15,000 for the construction of a macadam pavement.

Full particulars on application to

J. ROBINSON,
Clerk, Steelton, Ont.

46-48-91

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

CITY OF EDMONTON

Engineering Department
1913

Sealed tenders, addressed to the undersigned, and endorsed "Tenders for Paving, 1913," will be received at the office of the City Commissioners, Edmonton, Alberta, until 12 o'clock noon on **December 10th, 1912**, for approximately 100,000 sq. yards of Asphalt and Bitulithic Pavement.

Plans, specifications and all information may be obtained at the office of the City Engineer, or plans and specifications are on file at the office of the Contract Record & Engineering Review, and the Canadian Engineer, Toronto.

Companies wishing to tender on Asphaltic concrete pavement submit their own specification, with tendered prices.

A deposit fee of Fifteen Dollars ($15) is required when plans and specifications are taken away. This fee will be refunded, provided that the plans and specifications are returned within ten days after closing of tender.

An accepted cheque for the amount of Five Thousand Dollars ($5,000) must accompany each bid.

The lowest or any tender not necessarily accepted.

CITY COMMISSIONERS.

Office of the City Commissioners,
Edmonton, Alta., Nov 6, 1912

47-49-3

TENDERS FOR
BRIDGE ERECTION

Sealed tenders, plainly marked as to contents, will be received at the office of the undersigned, up to noon of **Friday, December 20th, 1912**, for the erection of four (4) Steel Bridges of 75 ft. clear span, in the County of Simcoe. Steel will be completely fabricated and placed on the bridge sites near the Towns of Alliston, Creemore and Beeton.

Plans and Specifications and all necessary information may be obtained at the office of the undersigned, 57 Adelaide street east, Toronto.

The lowest or any tender not necessarily accepted.

FRANK BARBER,
Civil Engineer.

Toronto, Nov. 20, 1912. 48-7

Mail Contract

Sealed tenders addressed to the Postmaster General, will be received at Ottawa until noon, on Friday, the 20th of December, 1912, for the conveyance of His Majesty's mails on a proposed contract for four years, six times per week, over Rural Mail Route from Newmarket, Ont., to commence at the Postmaster General's pleasure.

Printed notices, containing further information as to conditions of proposed contract may be seen and blank forms of tender may be obtained at the Post Office of Newmarket, Glenville, Holland Landing, and at the office of the Post Office Inspector at Toronto.

G. C. ANDERSON,
Superintendent.

Post Office Department,
Mail Service Branch,
Ottawa, November 4th, 1912. 46-48-88

CITY OF REGINA

Tenders for

Power House, Laundry and Refrigerating Plant

at Regina General Hospital

Sealed tenders, endorsed "Tender for Construction of Power House, Laundry and Refrigerating Plant, Regina General Hospital," and addressed to the City Commissioners, Regina, will be received until 12 o'clock noon, **Saturday, December 14, 1912.**

Full particulars may be obtained upon application to Wenger & Cockburn, Room 208, Aldon Block, 12th avenue, Regina.

Each tender must be accompanied by an accepted cheque for $2,500 made payable to the order of the City of Regina, which will be forfeited if the tenderer fails to execute the contract and bond when requested to do so.

The deposits of the unsuccessful tenderers will be returned when the contract is signed.

A deposit of $10 must be made with the application for the plans, as a guarantee of their return.

Proposals must be upon form of tender to be supplied upon application and must be in accordance with the provisions of the specifications.

Plans may be seen on file at the office of the Builders' Exchange, Winnipeg, and the Consulting Engineers, Regina.

The lowest or any tender not necessarily accepted."

L. A. THORNTON,
City Commissioner.

48-49-12

To Builders

Tenders will be received by the undersigned till 5 p.m. on **December 6th** for the erection of a Sunday School Building in connection with Walmer Road Baptist Church.

The lowest or any tenders will not necessarily be accepted.

BURKE, HORWOOD & WHITE,
Architects,
28 Toronto Street.

48-8

Debentures for Sale

Tenders will be received for the sale of Debentures of the Town of Alliston to the amount of $7,000, for waterworks improvements and extensions, earning interest at the rate of five per cent. repayable in 20 annual payments for principal and interest from the first day of December, 1912. Tenders to be received up to the **2nd** day of **December, 1912**, and to be marked "Tenders for Debentures."

WM. LOCKHART, Clerk,
Alliston, Ont.

Alliston, Nov. 19, 1912. 48-6

Board of Education

TENDERS WANTED

New Central Technical School

The Advisory Industrial Committee of the Board of Education will receive sealed tenders, whole or separate, addressed to the Secretary-Treasurer of the Board on or before

Tuesday Noon, January 7th, 1913

for the several trades required in the erection of

New School Building

fronting on Lippincott St., Toronto.

The architect's specifications and drawings may be seen and information obtained at the office of the Architects, Messrs. Ross & MacFarlane, Room 506, 59 Yonge street, and the Engineers' Specifications and Drawings of the Plumbing, Heating, Power Plant and Wiring, etc., at the office of the Canadian Domestic Engineering Co., Limited, 47-51 King street west.

Each General Tender must be accompanied with a certified bank cheque or money to the amount of Five Thousand ($5,000) Dollars, or for Separate Trade Bids with a certified bank cheque for five per cent. of the amount of tender, or its equivalent in cash, but not exceeding $5,000.00.

Tenders must be in the hands of the Secretary-Treasurer, at his office in the City Hall, not later than 12 o'clock noon on the day named, after which no tender will be received. The lowest or any tender will not necessarily be accepted.

W. O. McTAGGART,
Chairman of Advisory Industrial Committee
W. C. WILKINSON,
Secretary-Treasurer.

48-10

Tenders Wanted

Tenders will be received by the undersigned up to **Saturday night, December 7th,** as follows:

For laying 650 ft. of 16-in. Steel Intake Pipe in Trout Lake, with the necessary crib for elbow at outer end and placing five flexible joints in the pipe line.

Laying about 50 ft. of 12-in. Cast Iron Pipe with necessary beads and placing two valves and connecting to pump.

All pipe, lead, and special castings to be supplied by the Corporation on board cars at North Bay.

Tenderers to state time required to complete the work after material has been supplied. A marked cheque for $100 to accompany tenders.

Plans and specifications may be seen at the office of the Commissioner of Works, North Bay.

The lowest or any tender not necessarily accepted.

T. N. COLGAN,
Commissioner of Works.
North Bay, Nov. 23, 1912. 48-49-11

TENDERS
for
Annual Supplies
Department of Works

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, up to noon on **Tuesday, December 10th, 1912,** for

Refined Asphalt,
Brass and Bronze Castings,
Brass Work for House Services,
Cast Iron Pipes,
Crushed Stone,
Cement,
Cedar Posts,
Field Tile,
Granite Boulders,
Hardware,
House Numbers,
Hydrants,
Treated Wood Blocks,
Iron Valve and Stop Cock Boxes,
Iron and Steel,
Lead Pipe,
Limestone Dust,
Lubricating Oils,
Lumber,
Paving Block,
Rubber Valves, etc.
Sand and Gravel,
Special Castings,
Sewer Pipe,
Stop Valves,
Street Signs,
Sewer Brick,

Specification and tender form for any of the foregoing may be obtained upon application at the Head Office of the Department of Works, City Hall, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The usual conditions relating to tendering as prescribed by city by-law, must be strictly complied with, or the tenders may be declared informal.

Tenderers shall submit with their tenders the names of two personal sureties, approved by the City Treasurer, or in lieu thereof, the bond of a guarantee company as aforesaid.

The lowest or any tender not necessarily accepted.

H. C. HOCKEN, Mayor,
Chairman Board of Control
City Hall, Toronto, Nov. 20, 1912

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price. B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg 11 t f
Toronto, Ont 46 94

Wanted

Locomotive crane or travelling derrick 35 to 50 foot boom. Must be in good condition. York Sand & Gravel, Limited, East Toronto, Ont. 47-50-99

Practical engineer and draughtsman, English, age 42, with life experience in the design and manufacturing of locomotive and derrick cranes, and other contractors' plant, seeks situation. Apply to Box 653, Contract Record, Toronto, Ont. 48-49-13

Agents Wanted

Large United States manufacturer desires to appoint agencies in Canadian territories, where not already represented, for the best line of Concrete Waterproofing coatings made. Attractive proposition. Box 621, Contract Record, Toronto, Ont. 42-53 T.F.

Yellow Pine Timber

We have on hand in London, three car-loads of Yellow Pine Timbers, 8 x 14 to 12 x 14, 12 x 24 ft. long. Prompt shipment can be made. For further particulars apply to the London Lumber Co., London, Ont. 48-49-9

Situations Vacant

City Engineer Wanted

Applications will be received by the undersigned up to **December 15th, 1912,** for the position of City Engineer of the City of Peterborough. Applicants will state qualifications, experience and salary expected.

S. R. ARMSTRONG,
City Clerk.
Nov. 19, 12
18-50-5

Residences

(Continued from page 91)

Bowmanville, Ont.

Bowmanville Building Co. has purchased four acres in different parts of town and will erect four double brick workmen's houses.

Calgary, Alta.

Residence, cost $4,000, Walker street. Architect and general contractor, J. S. Wannop, 305 2nd street west. Two stys., 28 x 36, frame, art stone, cement foundation. Excavating started.

Halifax, N.S.

Residence, cost $8,500, Rosebank, planned for J. E. Furness, manager Furness-Withy S. S. Co., Upper Water street. Architect, Herbert E. Gates, Telephone Bldg. Tenders received by owner. 2½ storeys, concrete foundation, frame construction.

Residence, cost $7,000, for Capt. J. Harrison, c/o Furness-Withy S. S. Jo., Upper Water street. Architect, Herbert E. Gates, Telephone Bldg. Tenders received by owner. 2½ storeys, concrete forndation, frame construction.

Hamilton, Ont.

Two residences, cost $6,500, for Telford Bros., Fairmount ave. Two storeys, concrete foundation. Plans in progress.

Ottawa, Ont.

Two double tenements, cost $9,000, for David Potter, "Prince Albert," Eastern Ottawa, 33 x 40, brick veneer construction, stone foundation. Plans in progress.

Residence, cost $7,000, planned for A. M. Davis, c/o McAuliffe-Davis Lumber Co. Architect, C. P. Meredith, Sparks street. Three storeys, brick veneer construction, stone foundation. Plans are with owner.

Toronto, Ont.

Residence, cost $10,000, Lyndhurst ave., for Redmond & Beggs, Kent Bldg. (in trust). Tenders received by architects for plastering, heating, plumbing, carpentry and wiring for one flat.

Apartments, cost $6,000, Bloor and Brunswick ave., for Wm. Phillips, Bloor and Brunswick ave. Tenders received by architects, Redmond & Beggs, Kent Bldg., after Nov. 25th. Three storeys, brick foundation, brick and stone construction.

Residence, cost $6,000, Grenadier Blvd. for W. A. McTaggart & Sons, 268 Dovercourt road. Architects, Redmond & Beggs, Kent Bldg. Stone foundation, cut stone and brick construction. Plans drawn.

Residence, cost $6,000, 194 Balsam ave. Owner and builder, A. M. Stewart, 607 Crawford street. 2½ storeys, brick foundation, brick construction. Plans drawn.

Residence, cost $3,500, Medland and Oakmount road, for Jas. Pengelly, 742 Keele street. Stone foundation, brick construction. Plans drawn.

Five detached residences with garages in rear, cost $26,250, Castle Frank and Dale ave. Owner and builder, A. W. Reid, 87 Pleasant Blvd. 2½ storeys, brick foundation, brick construction. Plans drawn.

One pair semi-det. residences, cost $7,000, Eleanor ave. Architect and builder, Geo. E. Case, 56 Oakmount ave. Two storeys, brick construction and foundation. Plans drawn.

Winnipeg, Man.

Residence, cost $4,000, Polson ave., for Greenberg Bros., 362 Selkirk ave. 2½ storeys, 20 x 28, stone foundation, frame construction. Plans ready.

CONTRACTS AWARDED

Brantford, Ont.

Residence, Pearl, for First Baptist Church. Builder, Jas. Fitness. One sty., 27 x 40, cement and brick foundation, brick and clay construction.

Calgary, Alta.

Residence, cost $5,000. Owners and builders, Despine Bros., Box 1353. Two storeys, 26 x 34, cement foundation, frame construction. Excavating started.

Residence, Bridgeland, for J. H. M. Montford, 206 David Block. Builders and general contractors, Consolidated Building & Investment Co., David Blk. Two storeys, 38 x 34, cement foundation, frame construction.

Residence, cost $5,000, Mt. Royal, for A. S. Carr, 1210 13th ave. west. Architect and general contractor, W. Welsh, 2121 Hope street. Two storeys, 27 ft. 6 in. x 40 ft., cement foundation, frame construction.

Residence, cost $7,000, Elbova, for G. N. Bull. Architect and general contractor, J. C. Leslie, 223 25th ave. west. Two storeys, 31 x 50, brick and cement foundation, frame construction. Excavating started.

Two residences, cost $5,000, for J. P. Jacques, 125 7th ave. east. Builder, I [illegible] ey, Bridgeland. Two storeys, 21 [illegible] by [illegible] ft. 6 in., brick, cement fndn.

Residence, cost $5,000, Mt. Royal. Owner and general contractor, J. A. Hay, [illegible] 11th street west. Two storeys, 33 x [illegible] ft. [illegible] in., cement foundation, brick construction. Excavating under way.

Two residences, cost $10,000. Owner and general contractor, W. W. Duncan, [illegible] 8th ave west. Two storeys, 30 x 30, cement foundation, frame construction.

Four residences, cost $12,000, Crescent Heights. Owner and general contractor, [illegible] Hillocks, 229 3rd ave N.E. 2 storeys, 19 x 36, cement foundation, frame construction. Excavating under way.

Residence, cost $[illegible]5,000, Mt. Royal, for A. A. Dick. Architects, Holman & [illegible], Dominion Bank Bldg. General contractors, Jones & Lyttle Limited, Calgary. Two storeys, 50 x 46, stone and cement foundation, frame construction.

Cayuga, Ont.

Rectory for Church of England Congregation. Mason, Grant Herod. Work is being done under supervision of Percy [illegible] Walling. Two storeys, cement block foundation, cedar shingles, steam heating, gas lighting, hardwood floors, painting, plumbing and heating not yet let. Carpenter, Wm. Ralstone.

Hamilton, Ont.

Residence for M. Weightman, 311 Garth street. General contractor, William Theaker, 501 Garth street. Two stys., brick construction.

Apartment house, cost $5,000, for W. A. Noble, 217 West ave. north. Architects, Watt & Blackwell, 125 Lister Chambers. General contractor, W. A. Noble, 80 George street. Three storeys, [illegible] x 50, stone and brick construction, stone foundation.

Bungalow for E. B. Echlin, 248 Locke street south. General contractor, Geo. R. Patterson, 265 Charlton ave west. Mason, H. L. Smith, 80 Robinson street. Brick construction. Permit granted.

Residence, cost $3,000, for Mrs. D. McArthur, 3 Stanley ave. General contractor, W. H. Craddock, 318 Queen St. S. Two storeys, brick construction.

Residence, cost $3,100, for A. Dellen[illegible]h, 348 Charlton ave. west. General contractor, Geo. R. Patterson, 205 Charlton ave west. Mason, S. Kerr, 408 Garth street south. Two storeys, brick construction.

Montreal, Que.

Residence, cost $4,800, for E. N. Black[illegible]r, 1194 St. Andre. Builder, H. Char[illegible]u, 181[illegible] Clark. Three storeys, 26 x [illegible], brick veneer construction, cement foundation.

Residence, cost $4,200, St. Jerome. Owner and builder, W. Lapointe, 627 Garnier. Three storeys, 25 x 40, cement foundation, brick veneer construction.

Residence, cost $8,400. Owner and general contractor, G. N. Clermont, 35 St James. Architect, J. A. Ouellet, 250 [illegible]herst. Three storeys, 25 x 106, brick and stone construction, stone foundation.

Residence, cost $4,200. Owner and builder, Alex. Brunet, 630 Casgrain. 3 storeys, 25 x 50, brick veneer construction, cement foundation. Excavating done.

Residence, cost $9,600, 1552 Chabot. Owner and builder, H. Dubois, 1171 Papineau. Three storeys, 50 x 42, stone foundation. Foundations in.

Residence, cost $3,000, Sanguinet. Owner and builder, Jno. Campbell, 3344 Letang street. Two storeys, 25 x 35, cement foundation, brick construction. Excavating started.

Residence, cost $5,400, for J. P. Fremeu, 1058 St. Denis. Builder, P. L. W. Dupre & Cie, 567 Delorimier ave. Two storeys, 25 x 80, cement foundation, pressed brick construction.

Residence, cost $6,000, Albert street. Owner and general contractor, J. P. Tremblay, 341 Oxford street. Architect, R. Charbonneau, 15 St. James street. 3 storeys, 30 x 78, cement foundation, brick construction.

Three residences, cost $9,600, Old Orchard. Owner and builder, P. Blais, 292 Prudhomme. Two storeys, 25 x 38, brick construction. Foundations in.

Residence, cost $6,000. Owner and builder, Julien Toussaint & Fils, 2174 St. Denis. Three storeys, 25 x 70, stone foundation, brick construction. Excavating started.

Residence, cost $4,800, Charbonneau. Owner and general contractor, R. Messier, 2214 Jeaune d'Arc. Architect, Jos. Sawyer, Guy street. Two storeys, 26 x 40, brick veneer construction, cement foundation.

Residence, cost $4,200, 1233 Clark. Owner and builder, B. D. Adelmam, 1099 St. Urbain. Two storeys, 47 x 25, cement foundation, brick construction. Foundations in.

Residence, cost $4,800. Owner and builder, Theodule Charbonneau, 1114 Parthenais. Three storeys, 25 x 41, brick, cement foundation. Excavating started.

Residence, cost $4,800, 2nd ave. Owner and builder, Jeremie Champlain, 410 Second ave., Rosemount. Two storeys, 25 x 30, cement foundation, pressed brick construction. Foundations in.

Residence, cost $4,200, 20 Palm. Owner and builder, Lazare Morin, 67 Palm. Three storeys, 25 x 42, artificial stone, cement foundation.

Residence, cost $6,000, Lacasse. Owner and builder, G. Paguette, 148 Parc G. E. Cartier. Three storeys, 32 x 38, cement foundation, brick construction. Excavating done.

Residence, cost $4,200, Oxford, for F. Gaudette, 307 Marquette. General contractor, M. Courtemanche. Two storeys, 25 x 60, cement foundation, rustic brick construction.

Residence, cost $4,800. Owner and builder, C. A. Lemieux, 668 Casgrain. 3 storeys, 25 x 45, stone foundation, pressed brick construction. Excavating started.

Residence, cost $7,200, De La Roche, for A. Letourean, 1472 St. Laurent. General contractor, Wilfrid Lefebore, 190 Marquette. Two storeys, 50 x 45, cement foundation, brick construction.

Residences, cost $4,100. Owner and builder, Arthur Leger, 1118 Cartier. 3 storeys, 50 x 40, cement foundation, brick veneer construction. Excavating started.

Residence, cost $4,000. Owner and builder, J. P. A. Belanger, 2109 Poupart. Three storeys, 25 x 50, cement foundation brick construction. Foundations in.

Residence, cost $4,000, Boyer, for Latice Desormeau, 2037 Chateaubriand. General contractor, Lemelin Desormeau. Two storeys, 27 x 42, stone foundation, brick veneer construction. Excavating started.

Residence, cost $3,100, for J. B. Plouffe, 3562 Alice street. General contractor, J. B. Plouffe, 2452 Drolet. Two storeys, 28 x 50, cement foundation, pressed brick construction.

Ottawa, Ont.

Residence, cost $4,000. Owner and builder, Jacob Potowin, 250 Bell. Two storeys, 30 x 40, double brick veneer construction, stone foundation.

Residence, cost $4,500, for J. J. O'Conner, 174 Water street. Builder, R. Bingham, 22 Baird. 30 x 43, double brick veneer construction, stone foundation.

Residence, cost $7,000, Ernest. Owner and builder, W. F. Frazer, 279 Arlington. Two storeys, 87 x 36, brick veneer construction, cement foundation.

Power Plants, Electricity and Telephones

Kamloops, B.C.

Power station equipment. Clerk, J. J. Carment. Consulting engineers, Du Cane, Duther & Co., 319 Pender St. W., Vancouver. 1,000 h.p. steam, pumping and electric equipment for power station. Plans, specifications, etc., at office of Clerk, Engineer or R. S. Lea, New Birks Bldg., Montreal, Que. Tenders received by Clerk until December 5, 1912.

Winnipeg, Man.

Power transmission line at new wells. Board of Control, secretary, M. Peterson. Engineer, J. G. Glassco, 54 King street. Contract was awarded to the Light & Power Dept. for power transmission line from well No. 8 to No. 11.

Miscellaneous

Vancouver, B.C.

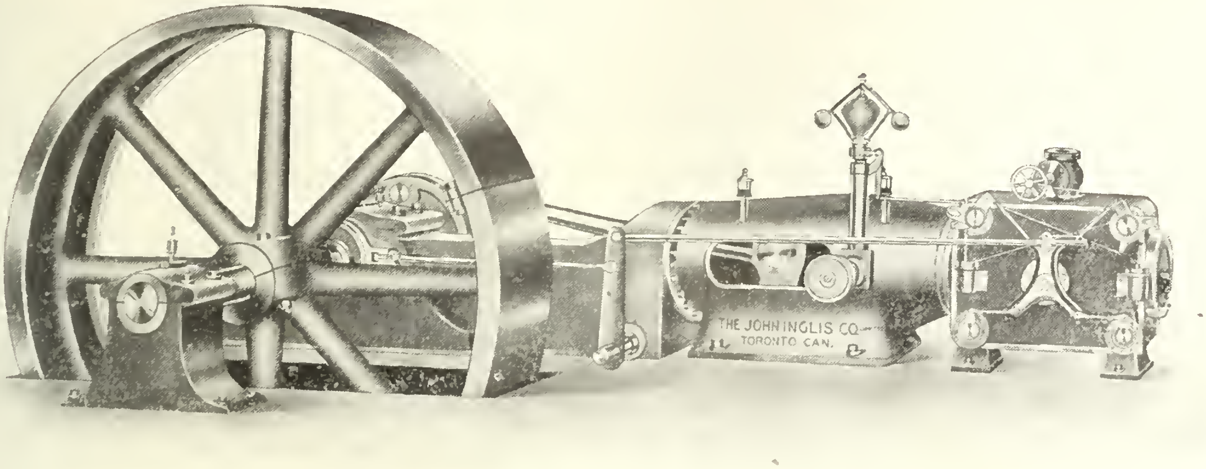
Gate valves. Six 18-in. double gate valves flanged, and seven 24-in. double gate valves. Specifications at Purchasing agent's office. Tenders received by Purchasing agent, Jas. Stewart, City Hall. Clerk, Wm. McQueen.

Winnipeg, Man.

Weatherproof wire, cost $12,870. Board of Control, Secretary, M. Peterson. Engineer, J. G. Glassco, 54 King street. General contractor, E. J. Phillips Electrical Works, Ltd., 601 Union Bank Bldg. at $21.45 per 100 lbs. For 60,000 lbs. weatherproof wire.

Line materials and supplies, Board of Control; Secretary, M. Peterson. Engineer, J. G. Glassco, 54 King street. Section A switches and fuses. Section B. primary cutouts. Section C. general supplies for year. Tenders received by secretary until Nov. 29. Specifications at engineer's office.

Estimating and Quantity Engineers
KORTRIGHT & GREENE
Quantities taken off. Estimates checked.
General Engineering for Contractors.
Colonial Bldg., 47 King St. W., Toronto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We acknowledge no superiors in the art of building high efficiency pumps, engines and boilers, but we would prefer to let our customers speak for us.

If you wish to instal a complete power plant or a new unit, write us at once, and we will be pleased to submit you names of previous purchasers for reference.

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The first Creosoted Wood Block Pavement laid in America was on Tremont Street, Boston, Massachusetts, twelve years ago.

This pavement was laid to secure a test of the wearing qualities of Wood Block.

The street was paved, partly with Asphalt of standard construction and partly with Creosoted Wood Block.

The Asphalt was taken up some time ago and street newly paved.

The guarantee has long since expired on the Creosoted Wood Block but the pavement is as good as ever, the surface wear is scarcely apparent, and it will be many years before repairs are necessary.

We have the very best materials and we endeavor to manufacture DOMINION WOOD BLOCKS up to the highest possible standard.

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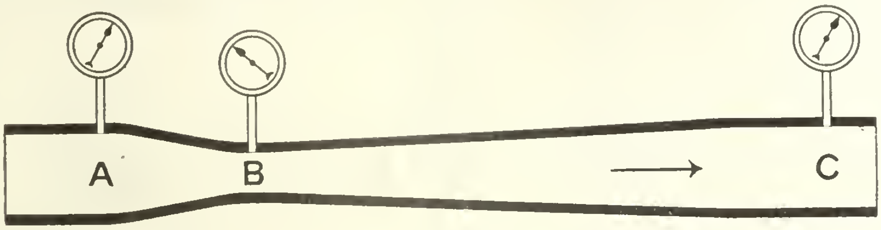
THE "VENTURI," BUILT BY THE BUILDER'S IRON FOUNDRY, IS THE ONLY TYPE OF METER WHICH CAN BE APPLIED SUCCESSFULLY TO SEWAGE MEASUREMENT.



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Sewage Venturi Meters from 10" to 60" diameter are now in successful operation on sewage mains. The Meter Tubes are specially designed and proper connections prevent the sewage from entering the registering or recording device. With Venturi Meters as part of the system, the city's sewerage department has definite knowledge of the total amount of sewage disposed of daily and by comparing the yearly increase can plan diligently for future extensions.

The slip of pumps handling sewage increases much more rapidly than with water and the Meter readings form an infallible guide in deciding the proper time to renew the pump valves and thus maintain a high pump efficiency at all times. It is extremely interesting to observe the gradual falling off in pump performance, this being especially noticeable after a heavy rain storm which sends leaves, twigs and other debris through the pump. For other applications

See Bulletin 75

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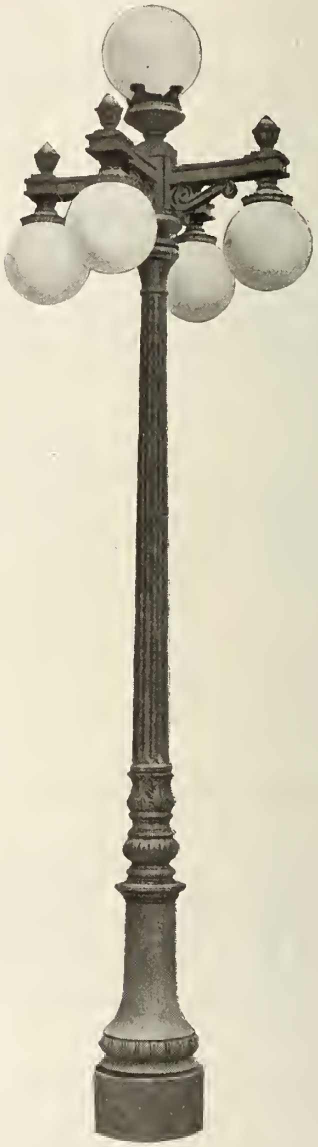

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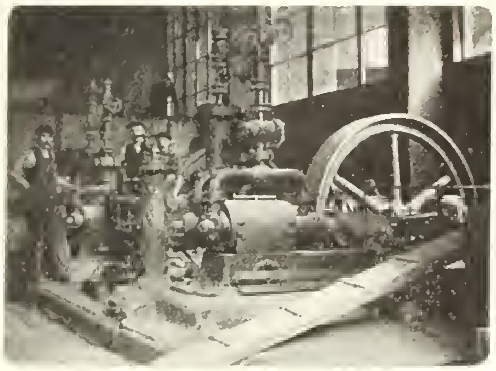

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The largest contract for installation of refrigerating plant in any hotel or railway station in Canada

Established in Great Britain 27 Years. *Established in Canada 18 Years.*

Operating in every country in the world, with plants or distributing offices at

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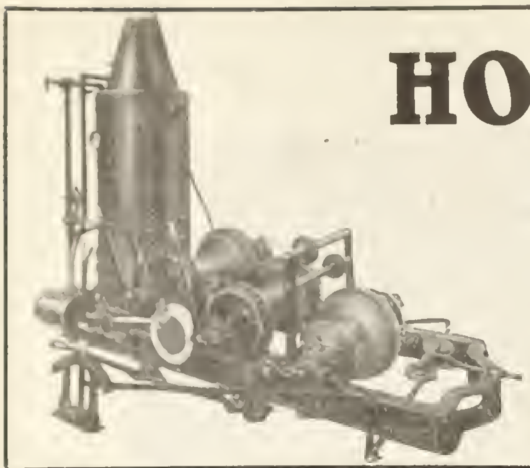

HOISTING ENGINES

Some of the strongest friends of the M. & H. Hoists are to be found among the men who have owned and used them. For instance the following written by one of the Lumber Kings of Canada—a man who telegraphed us an unsolicited order for another hoist not long ago.

"Answering your enquiry, I am pleased to state that the hoists with which you supplied me some years ago have given good satisfaction and have been in pretty constant use ever since.

No other Hoist in Canada has so many practical improvements as the M. & H. Hoist for 1912. Let us tell you about them.

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Sales Agents: MUSSENS Limited, Montreal **Belleville, Ontario**

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Prompt Shipments Guaranteed.

Rhodes, Curry Co., Limited

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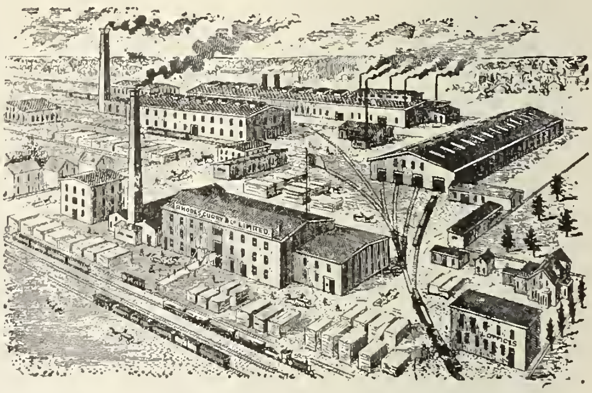

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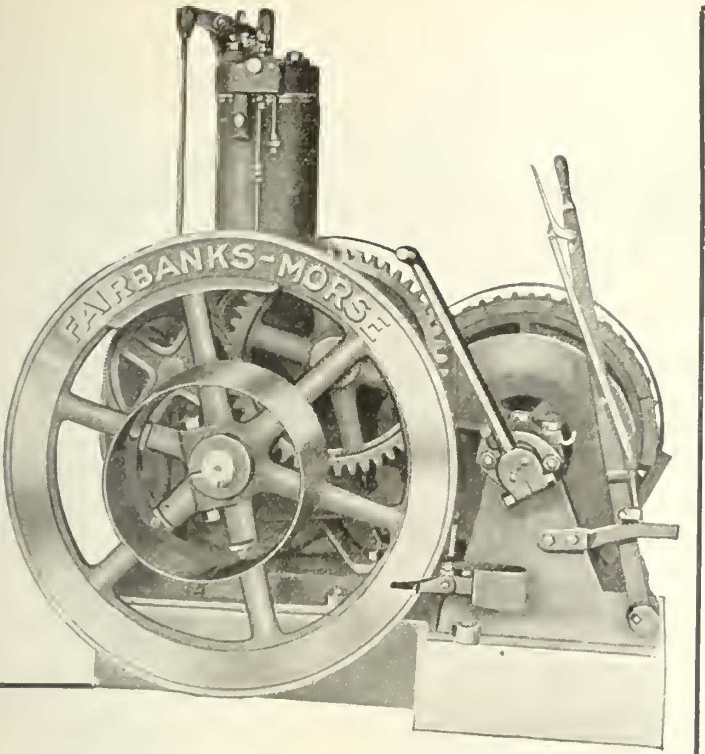

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The drum runs loose on the shaft, while the large gear is keyed fast. A friction clutch mechanism, with conical surfaces, is mounted on the drum, which enables the load to be handled quickly and positively by means of a hand lever. The gearing connecting engine to the hoist drum can be thrown out of mesh, when it is desired to use the engine for other purposes.

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Building construction
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Write for further particulars

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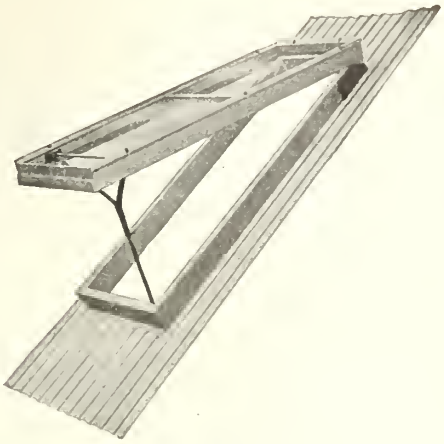

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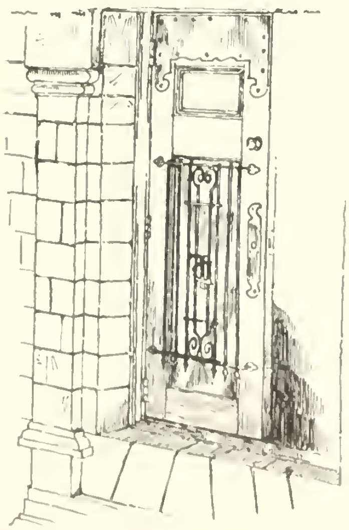

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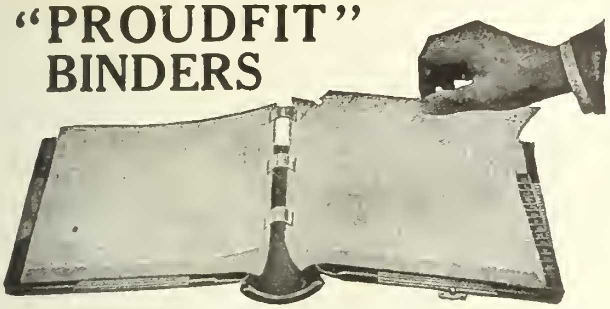

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Is time an important factor.
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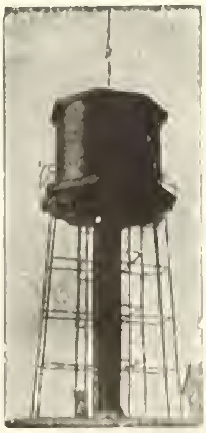

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Popular, because its deep uniform red shade is always the same and never fades.

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If you have a difficult job under any of these heads, send your sketches to us—our prices will be reasonable

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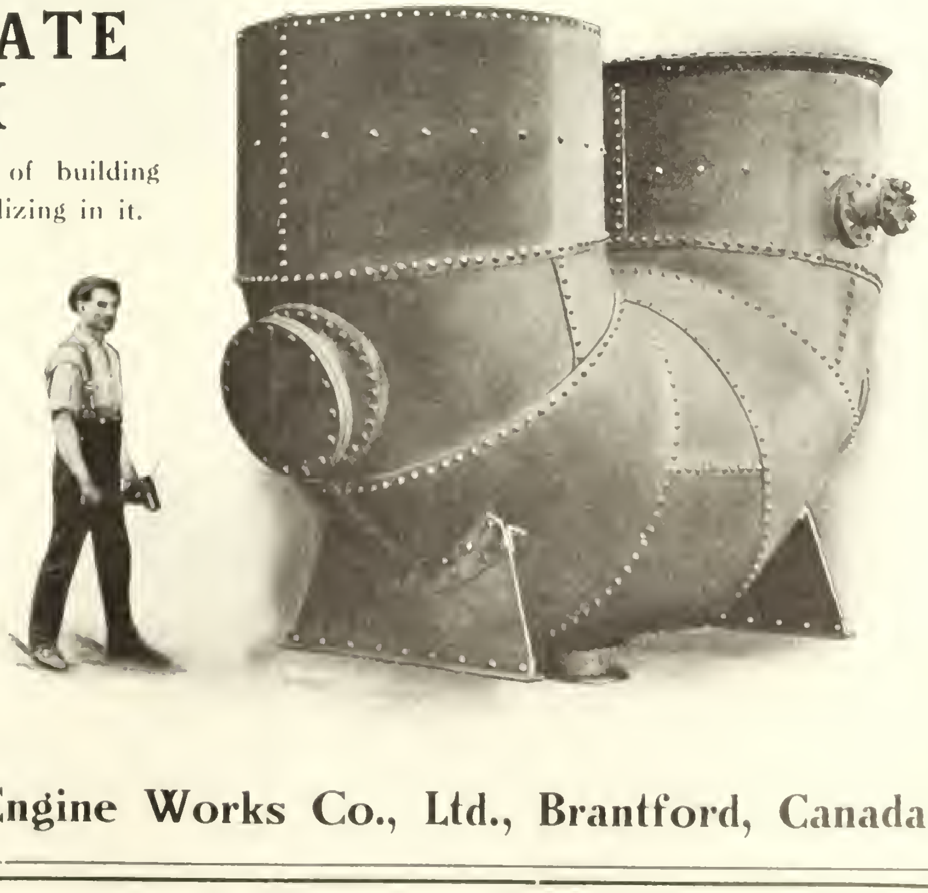

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Lap Welded Steel Pipe

We carry in stock

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LAP WELDED STEEL PIPE

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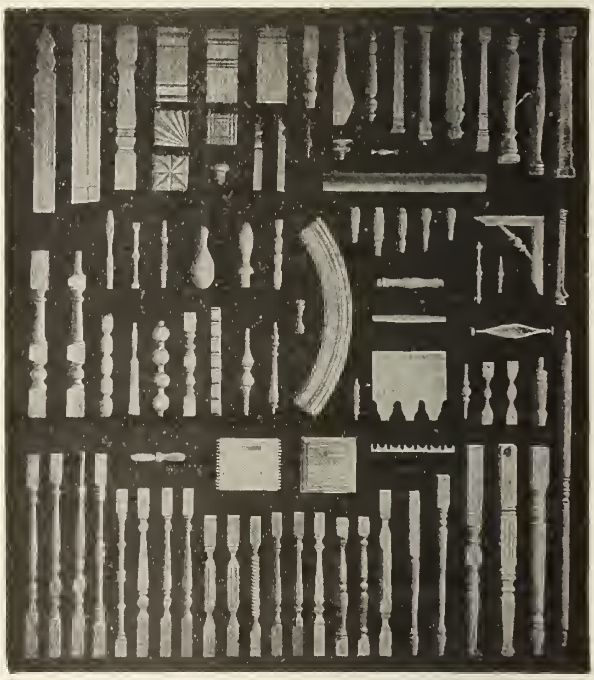

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All kinds of

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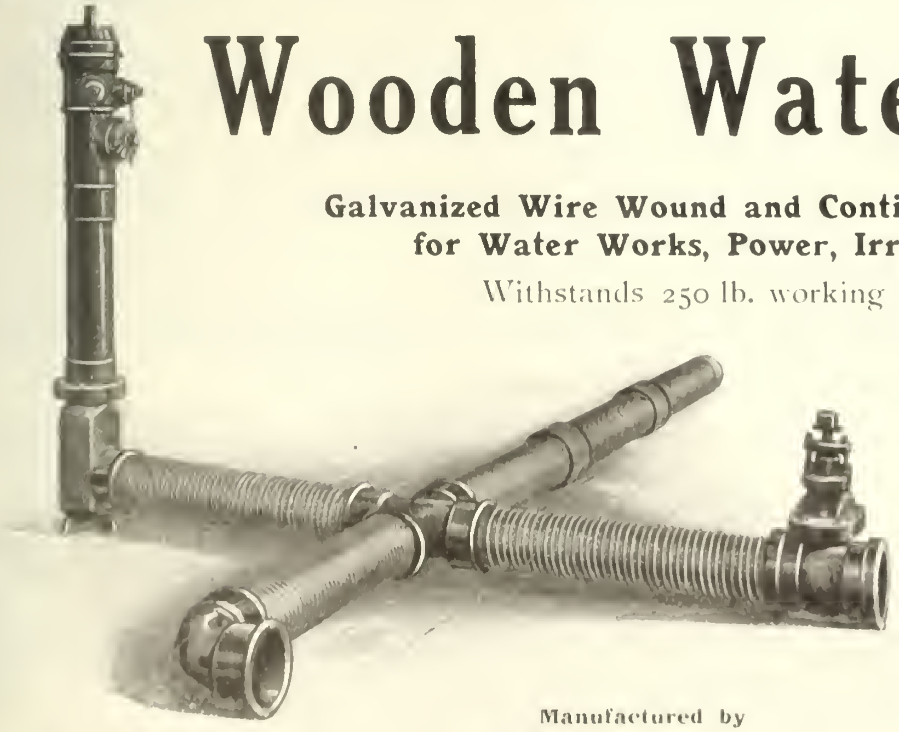
AUTOMATIC ELEVATORS—Passenger and Freight

Simplicity Foolproof High Efficiency Patent Single Phase Motor High Starting Torque



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Withstands 250 lb. working pressure.

Not affected by Frost, Corrosion, Electricity or Acid. Water Works Systems installed. Prompt attention to inquiries.

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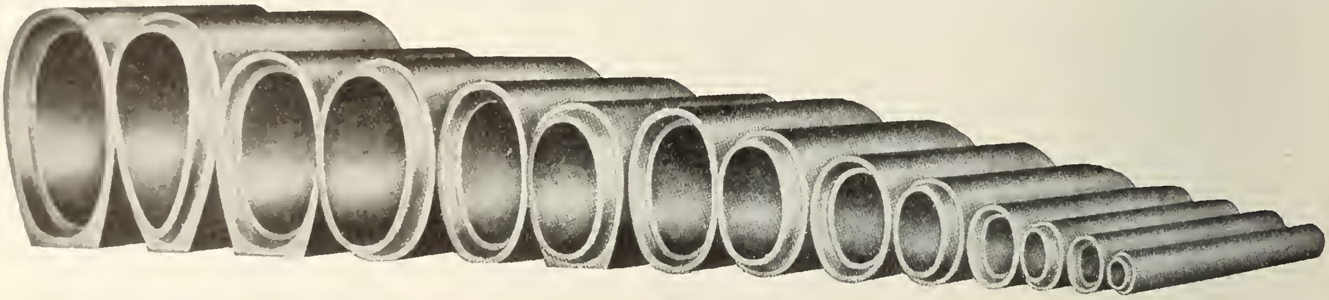

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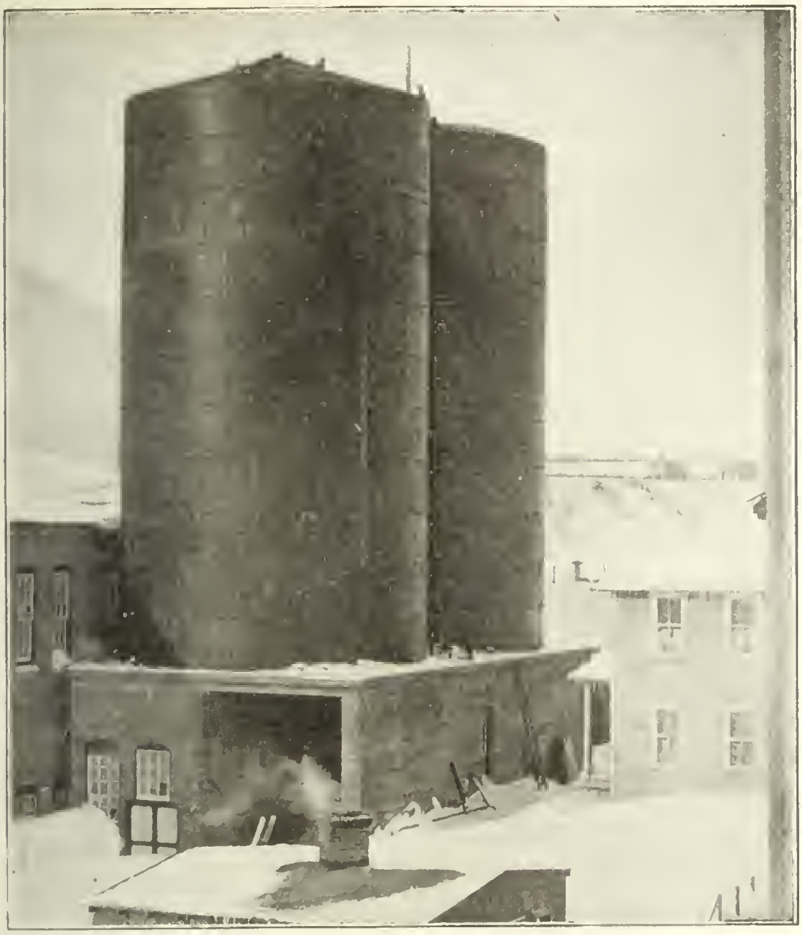

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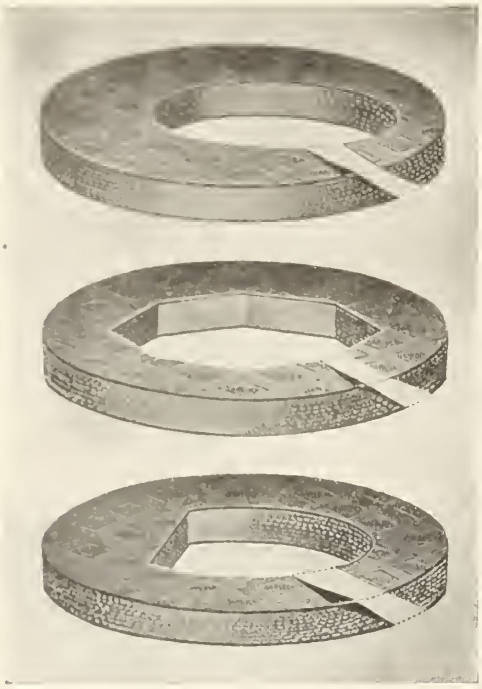

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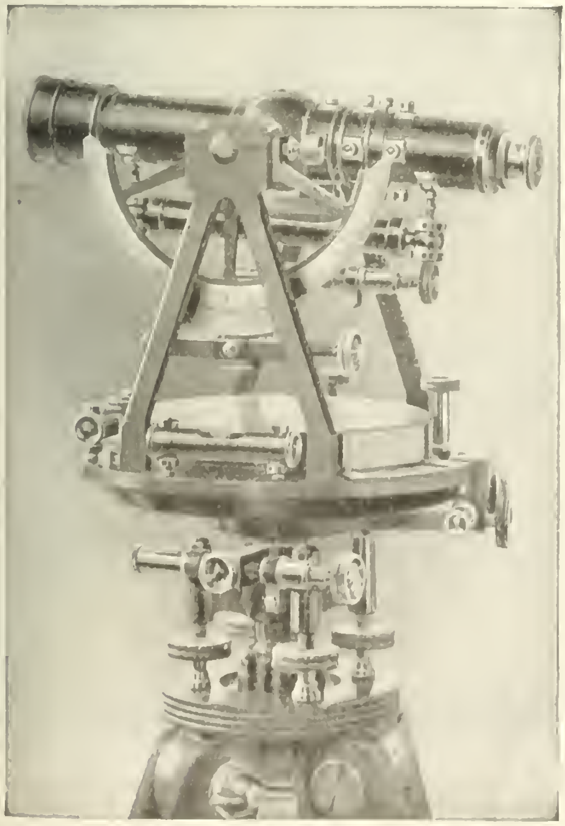

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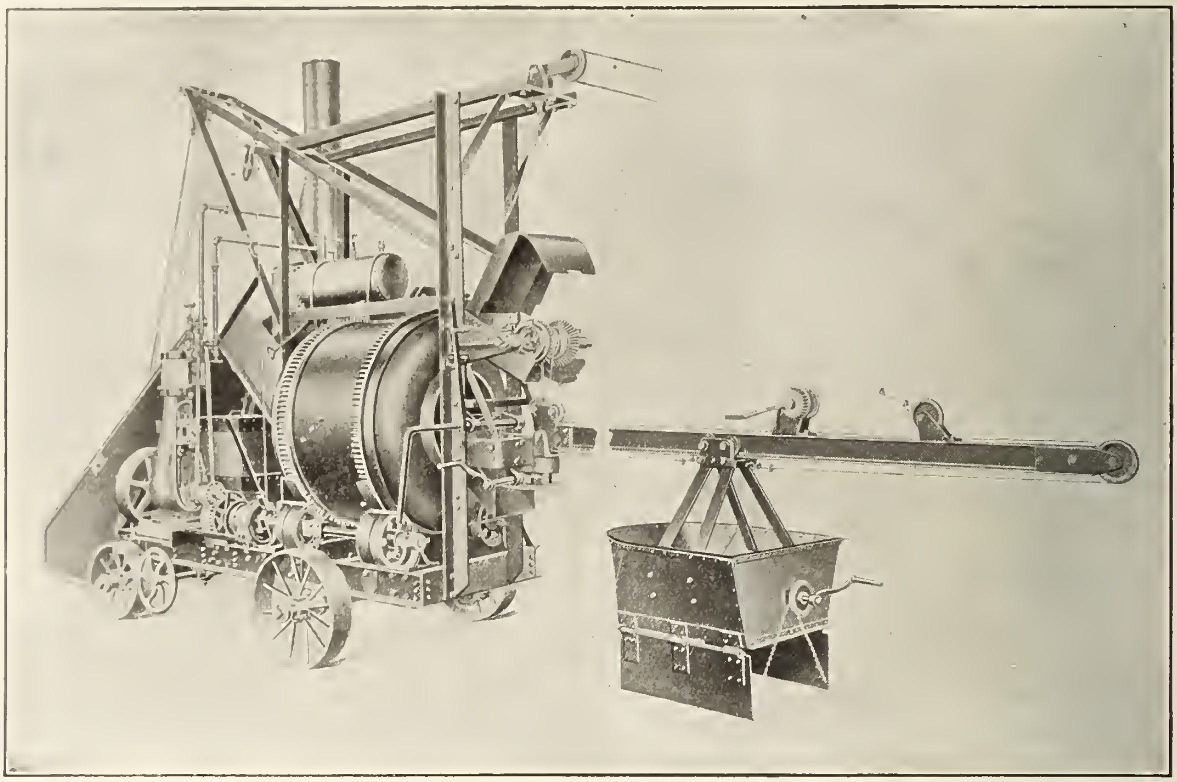

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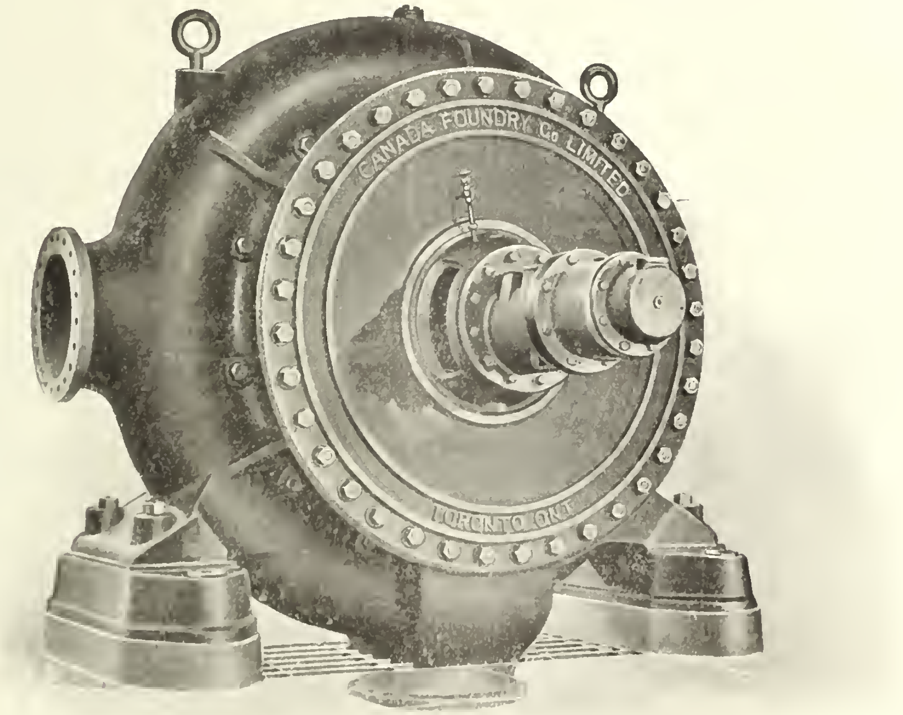

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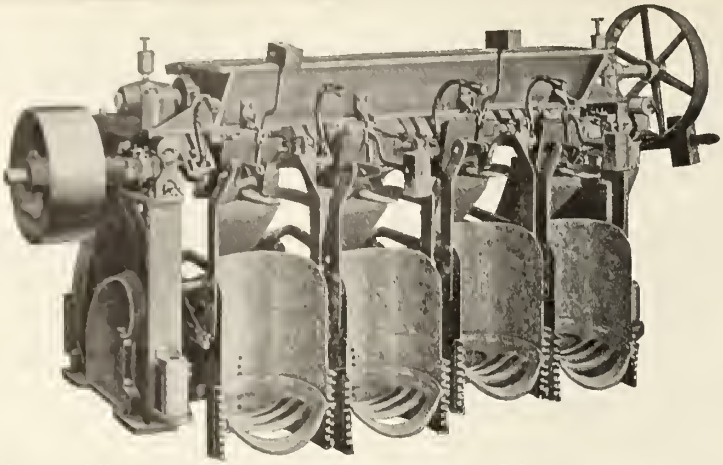

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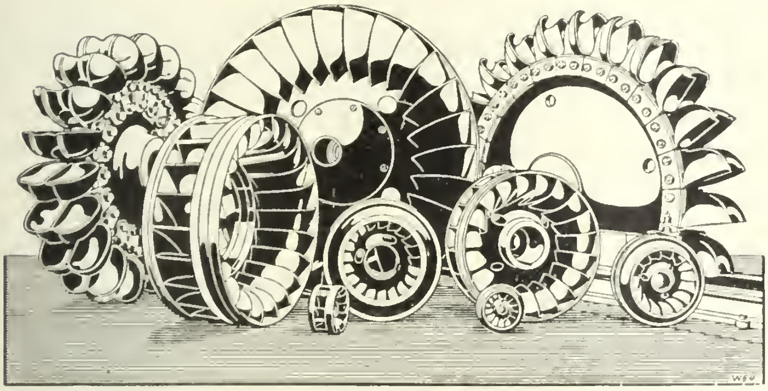

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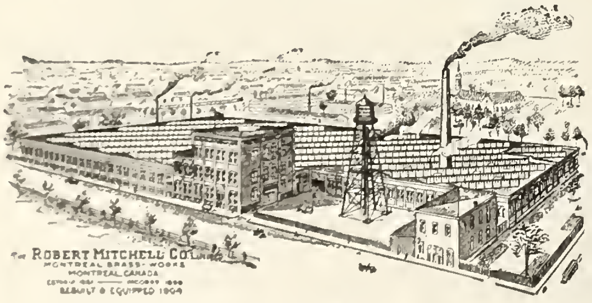

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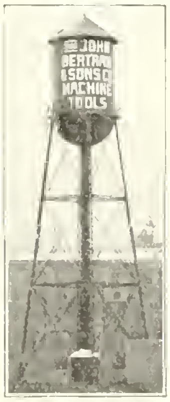

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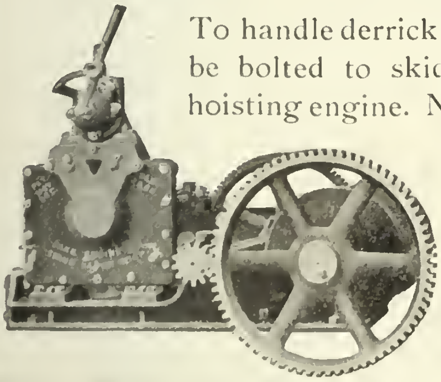

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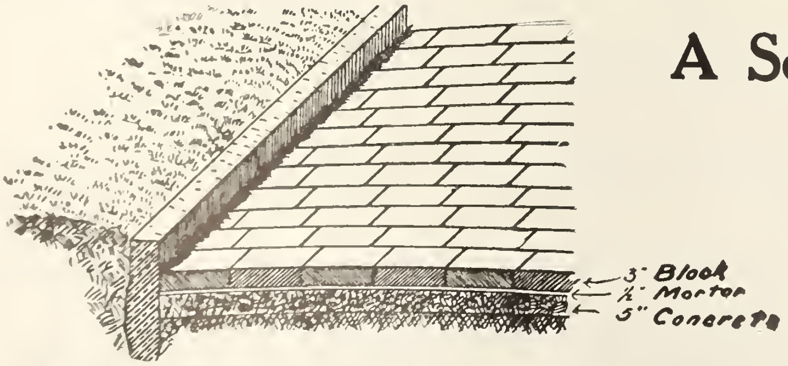

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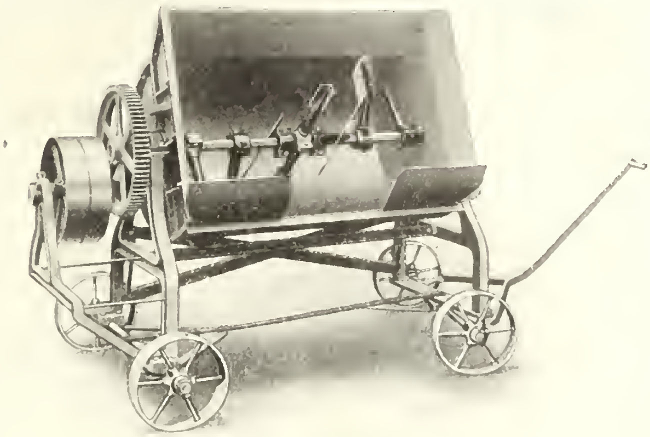

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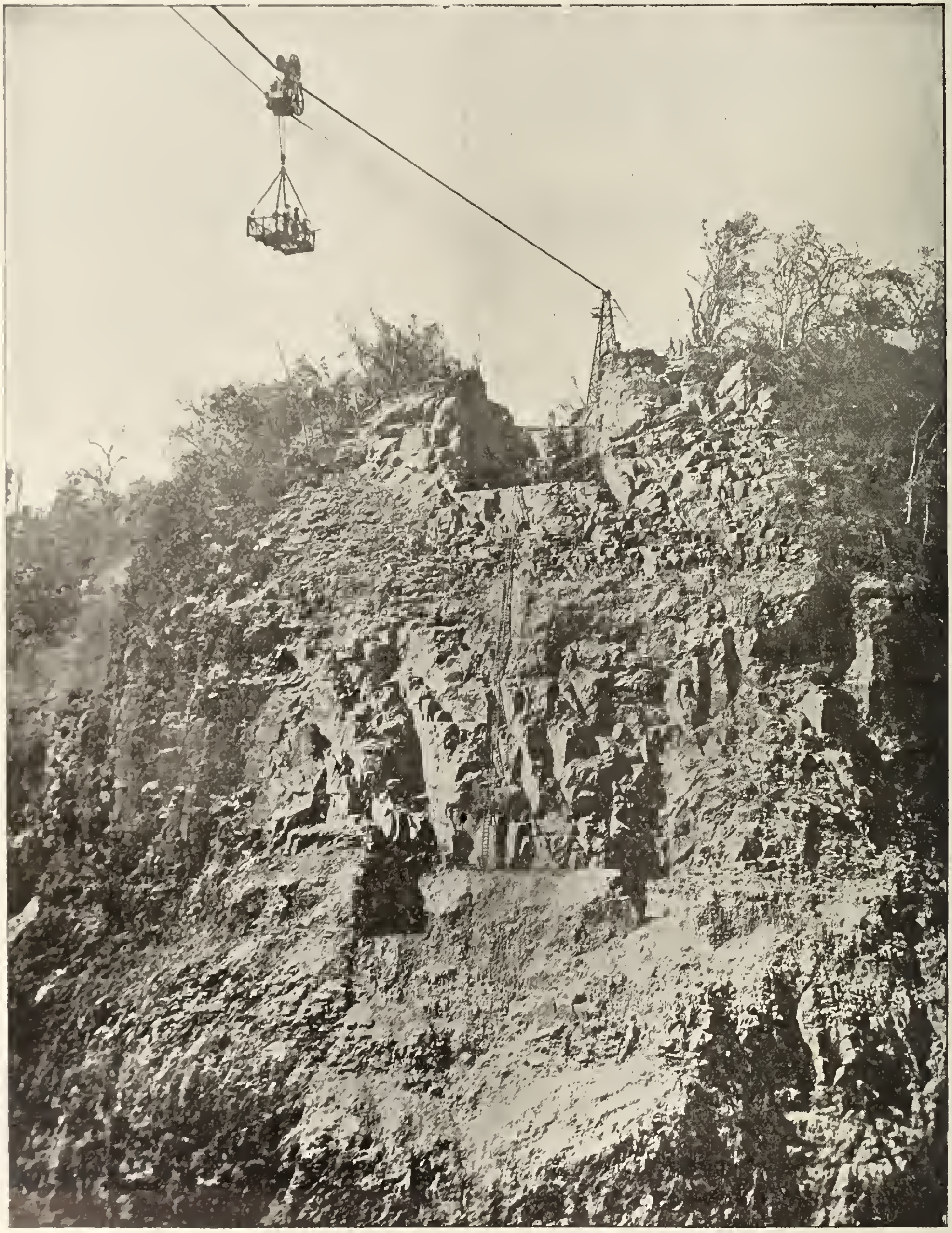

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	Per M
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No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	11 00
Wire cut bricks for foundation work	12 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

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Hemlock Lumber—		
2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00
Pine—		
1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pine Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	
Pine trim for paint finish—		
4 in. casing per 100 ft.	2 00	
5 in. casing per 100 ft.	2 25	
8 in. pine base, per 100 ft.	3 25	
10 in. pine base, per 100 ft.	4 25	
4 in. pine window stool	2 75	
Shingles—		
XXX B. C. Clear Shingles, per M.	3 60	
N. B. Extras	3 50	
N. B. Clears	2 90	
No. 1 pine lath, per M.	4 75	
No. 2 pine lath	4 25	
No. 1 spruce lath	4 00	
Cedar Posts—Fence—		
5 in. at small end, each	25	
7 in. at small end, each	35	
Hemlock lath	3 25	

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Following are the prices of glass at Toronto, Hamilton and London. The discounts are 15 per cent. for Star and 15 per cent. for D.D.

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40	4.60	6.75
41 to 50 “	5.10	7.50
51 to 60 “	5.35	8.50
61 to 70 “	5.75	9.75
71 to 80 “	6.25	11.00
81 to 85 “	7.00	12.50
86 to 90 “		15.00
91 to 95 “		17.50
96 to 100 “		20.50
101 to 105 “		24.00
106 to 110 “		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D.
25	$3.25	$4.75
40	3.45	5.20
50	3.85	6.00
60	4.10	6.50
70	4.35	7.00
80	4.85	7.50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

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Standard compression work, 60 per cent.

High grade compression work, 55 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 and 10 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.50

Square head brass cocks, 60 per cent.

Lead Pipe

Lead pipe, $7.50 net; lead waste, $9.00 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$2.04	¼ inch	$2.86
⅜ “	2.04	⅜ “	2.86
½ “	2.72	½ “	3.57
¾ “	3.16	¾ “	4.31
1 “	4.54	1 “	6.19
1¼ “	6.19	1¼ “	8.44
1½ “	7.43	1½ “	10.13
2 “	9.90	2 “	13.50
2½ “	15.80	2½ “	21.56
3 “	20.75	3 “	28.31

Malleable fittings—Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 67½; nipples, 4 inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 and 10 per cent.

Plain steel bars, $2.15.

Square twisted bars, ¾ to 1¼, $2.25.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 65 per cent.

7 and 8-inch pipe, 50 per cent.

Sewer Pipes

4-in.	25c ft.	15-in.	1.35 ft.
6-in.	40c ft.	18-in.	1.90 ft.
9-in.	65c ft.	20-in.	2.25 ft.
12-in.	1.00 ft.	24-in.	3.25 ft.

all less 60 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.80.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.55.

Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.45.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and heads, in the rough, delivered, 40 cents per foot.

Rubble stone in car lots, $1.30 per ton.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

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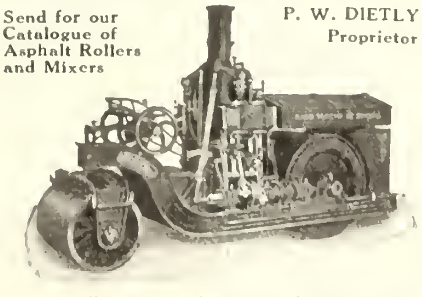

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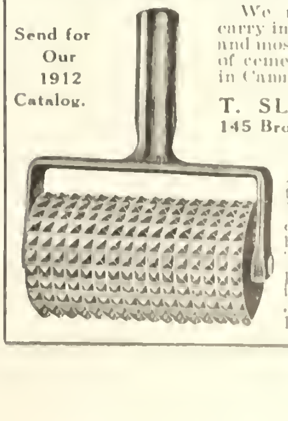

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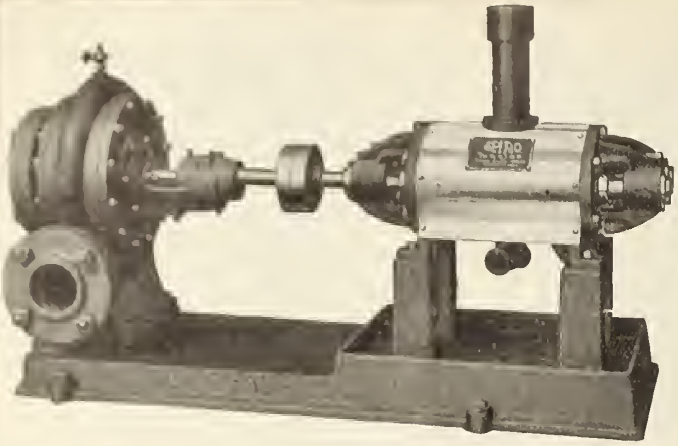

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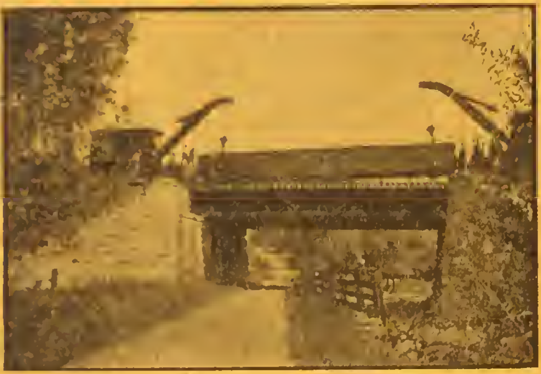

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Vol. 26 Toronto, December 4, 1912 No. 49

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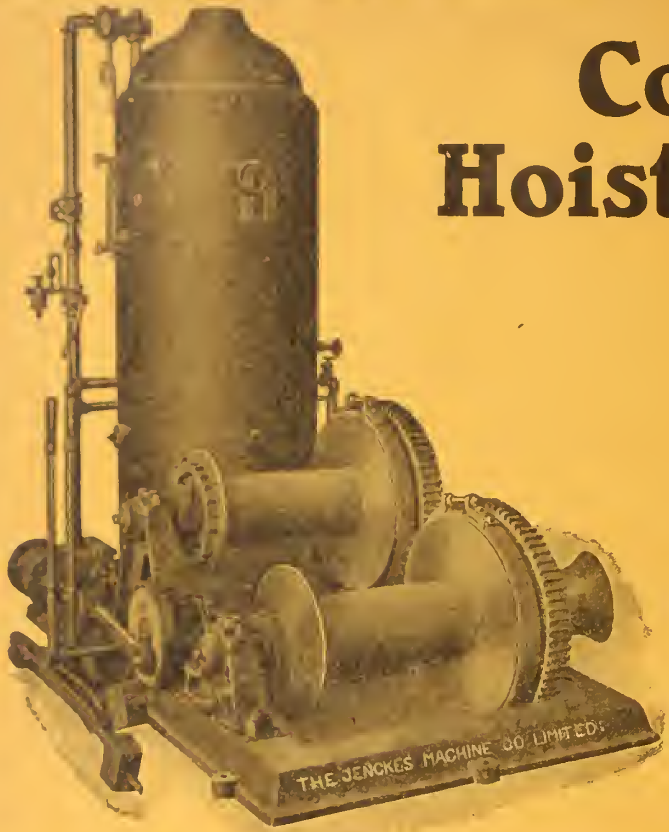

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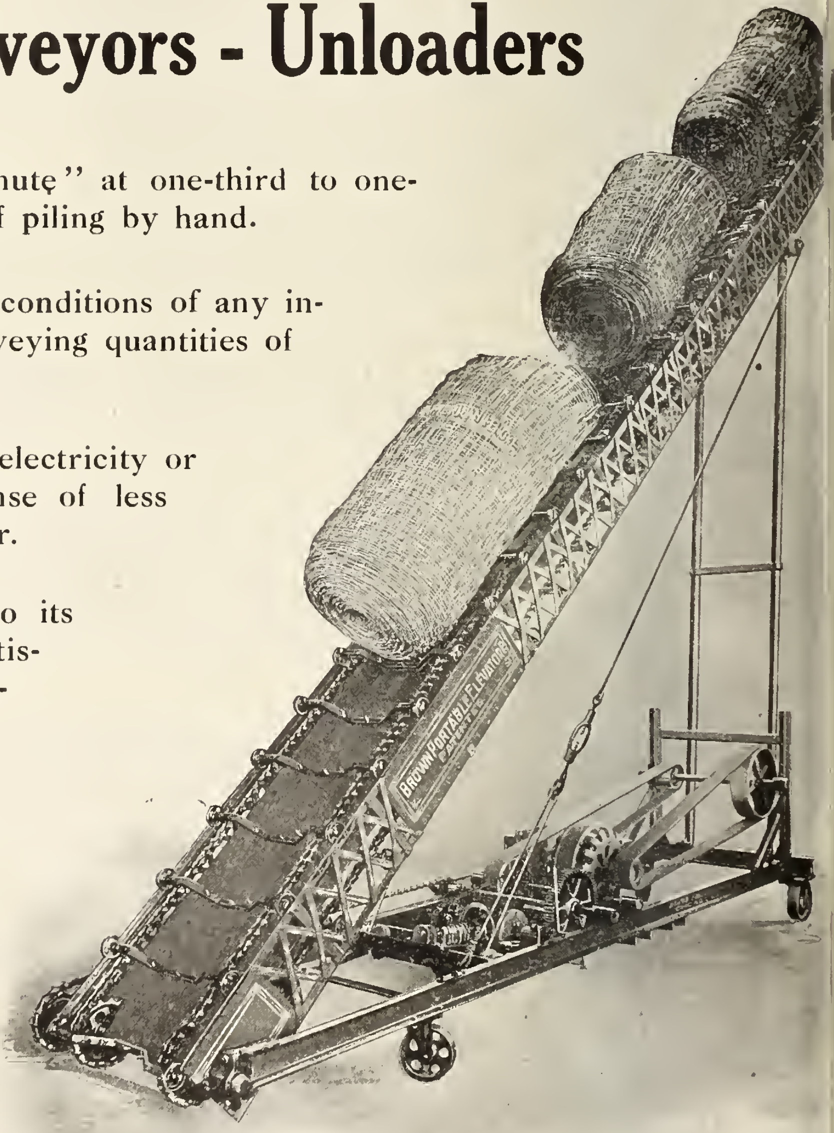
1. Handle "a ton a minute" at one-third to one-quarter of the cost of piling by hand.
2. Adaptable to special conditions of any industry, piling or conveying quantities of packed goods.
3. Operated by either electricity or gasoline at an expense of less than 10 cents an hour.
4. Guaranteed to do its work to the entire satisfaction of the purchaser.
5. Used by the largest concerns in many lines of industry, handling goods in bags, bales, bundles, at saving of 50 to 80 per cent of the cost of handling goods by hand.



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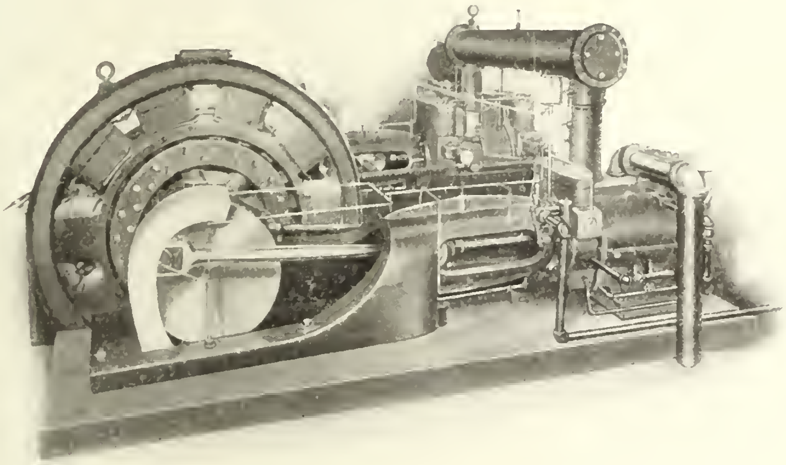
Air Compressors



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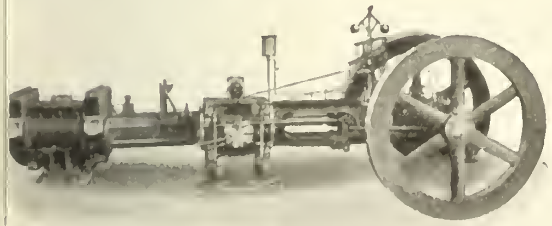

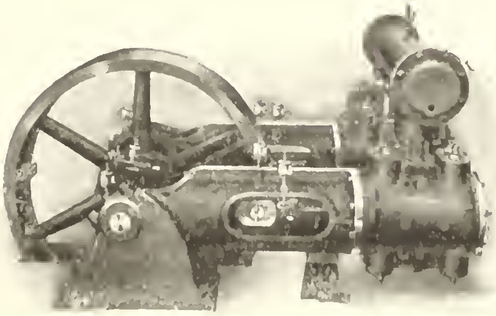

*Tell us your requirements and
we will make a proposition*

LIMITED

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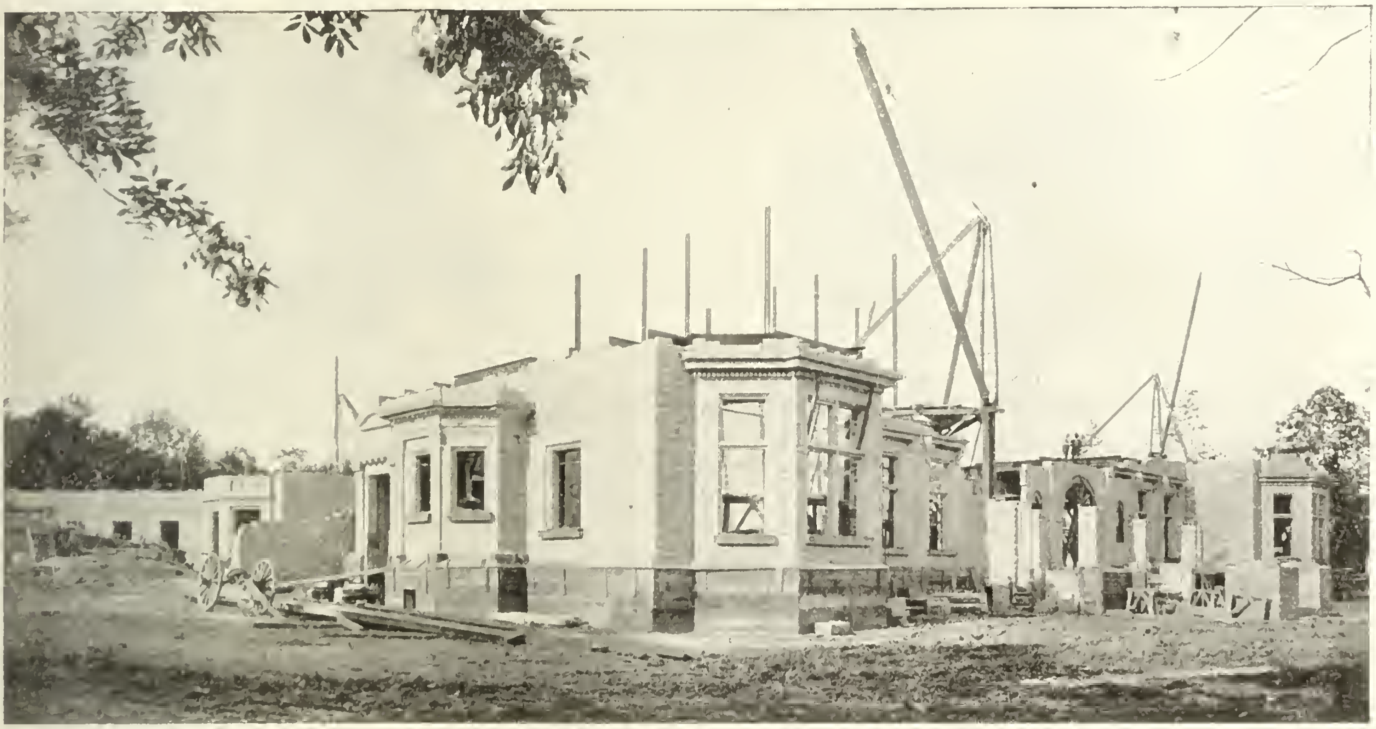

New Residence for Lieutenant Governor of Ontario, Toronto. Provincial Architect Heakes, Architect.
Don Valley Brick and Porous Terra Cotta used throughout.

Don Valley Bricks

are used in the construction of the most important public buildings erected by the Provincial Government. They are specified by the leading architects for every building of importance. The latest example of the public recognition of their superiority is found in their use for the new Toronto Residence of the Lieutenant Governor of Ontario. Don Valley Bricks possess a beauty of color and an even texture and form which add that touch of distinction to a building that characterises it as fulfilling the essentials of decorative dignity.

Don Valley Hollow Tile Fireproofing is absolutely dependable for that structural strength necessary to resist the action of age or any other deteriorating influence. For many years its success as a staple and fireproof building material has been established in hundreds of practical tests in buildings throughout the country.

"SPECIFY DON VALLEY PRODUCTS"

THE DON VALLEY BRICK WORKS

Head Office: 36 Toronto St., TORONTO
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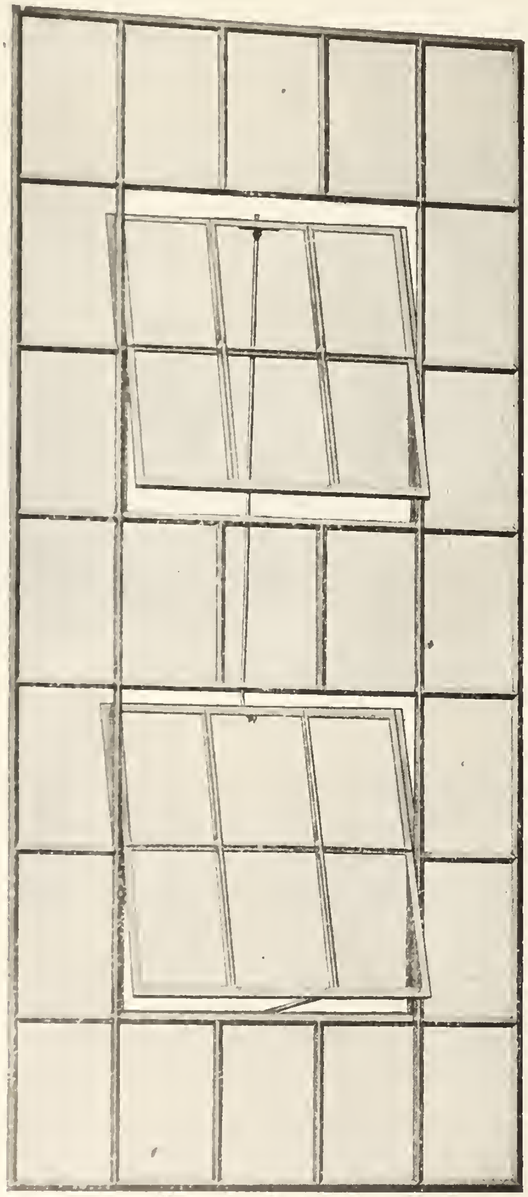
LET IN THE LIGHT



"Fenestra"

"Fenestra"
TRADE MARK

Solid Steel Sash

will afford

More Light—Better Ventilation

in any building where they are installed. "Fenestra" is a high-grade steel patented joint sash—it takes up minimum space and permits the maximum passage of light through the window.

"Fenestra" Solid Steel Sash requires no frame, sash weights or heavy mullions—the cost is thereby reduced so that the price compares favorably with the price of wooden sash even when the price is higher it is more than compensated for by the enormous advantages gained in

Strength, Durability, Handsome Appearance,
Weather Proofness and Fire-resisting Qualities

Besides that consider the permanence of steel as compared with wood and remember that with "Fenestra" Solid Steel Sash you save all the up-keep costs entailed by wooden sash and frames—in a big building that is a big item.

"Fenestra" Solid Steel Sash

proves itself an economy wherever used but is particularly suitable for

Factories, Foundries, Power-Houses, Prisons
Railroad Shops, Warehouses, Barracks, etc.

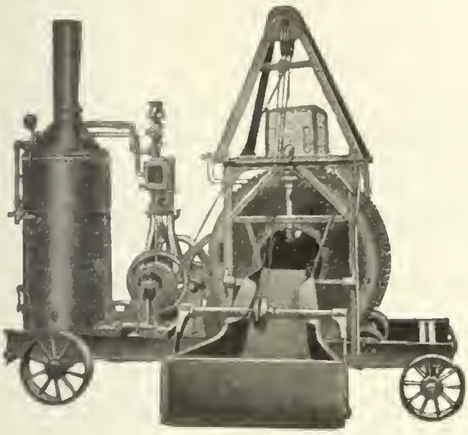
We will help you to settle the problem of your window requirements—write us.

STEEL and RADIATION, Limited

TORONTO, CANADA

London Concrete Mixers

are built in Many Styles and Sizes



London Standard Drum Batch Mixer

The MANY NEW and IMPROVED features of the LONDON MIXERS appeal to the contractor.

London Automatic Batch Mixer No. 2

The Enormous Sale of those machines is sufficient proof as to satisfaction they are giving. Everything made in our own shops.

Every machine HIGH GRADE.

Every machine sold under a STRONG GUARANTEE.

London Sill Step and Window Cap Mould

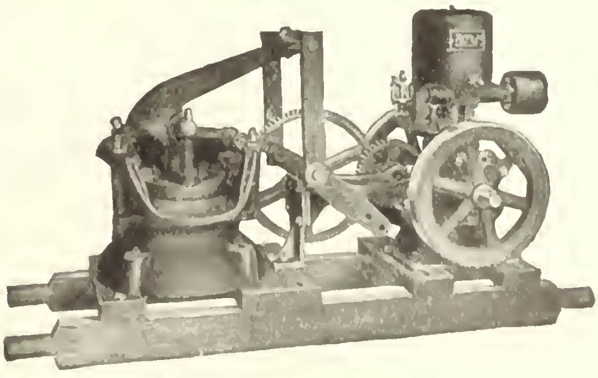
SEND FOR OUR 1912 CATALOGUE which shows our complete line. 160 pages of illustrated matter. It's a dandy.

We manufacture a complete line of Concrete Machinery, Cement Working Tools, Hoisting Engines and Contractors' Tools.

London Standard Drum Batch Mixer

WE ARE THE LARGEST MANUFACTURERS OF CONCRETE MACHINERY IN CANADA. That is why we can sell at such remarkably low prices.

Producing in large quantities reduces the cost of production.



Power Diaphram Pump Operated with Gas Engine

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

AGENTS:—

The Foss & Hill Machinery Co., Montreal Que. G. B. Oland, Halifax, N. S. B. C. Equipment Co., Vancouver, B. C. General Supply Co. of Canada, Ottawa, Ont.

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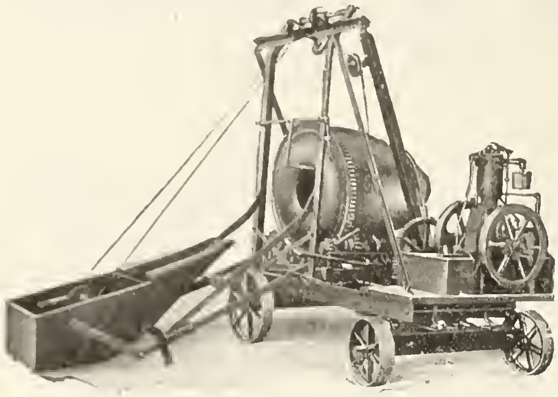
For Any Rush Job

You Are Forced to Admit

that

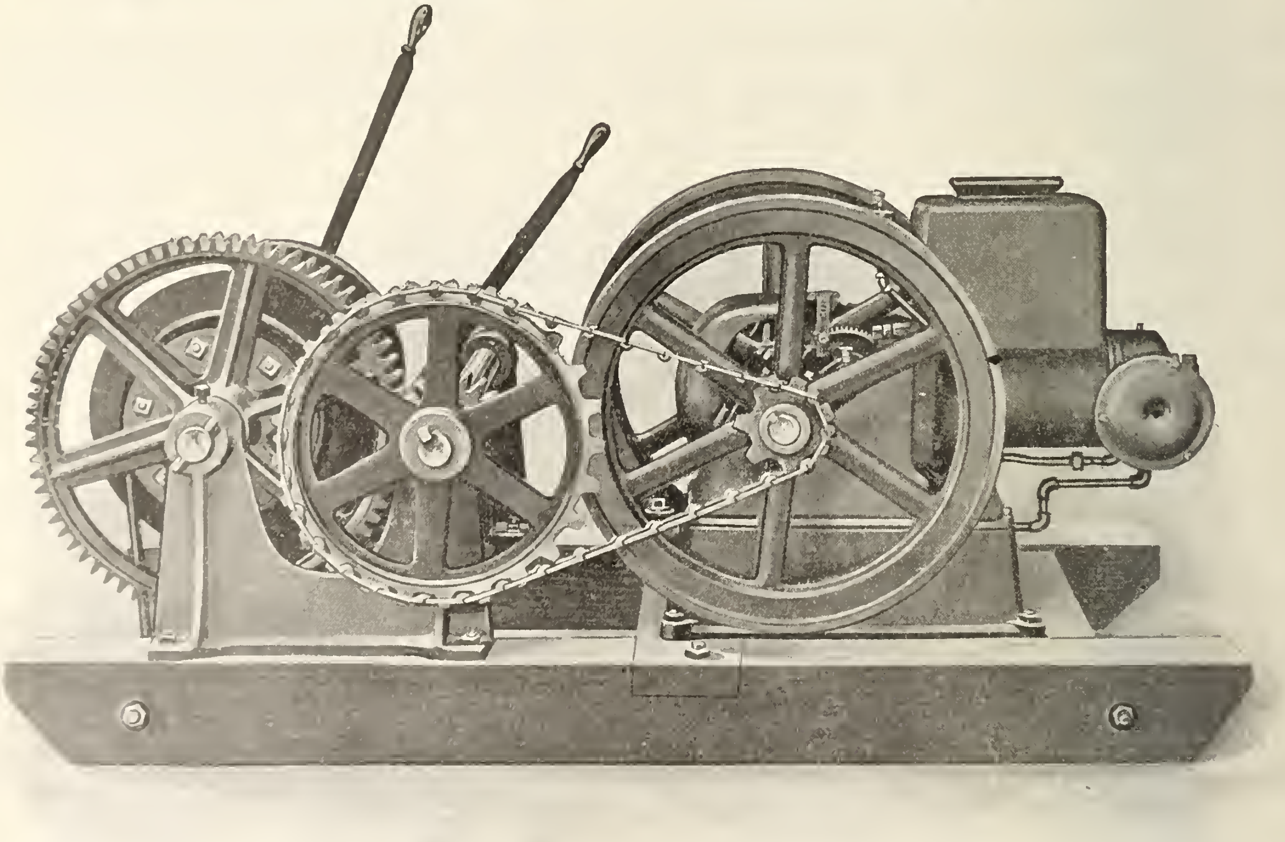
The Wettlaufer Improved Heartshape Mixer



Wettlaufer No. 1 Heartshape Mixer

will stand up to the work and see the job through with a certainty of good results that you can absolutely rely on. It will make yours a more profitable job by doing quick and perfect work with no stops for repairs.

Automatic operation—low running cost
Economical working throughout



Wettlaufer Single Drum Hoist No. 1

The most useful and complete hoist for all building and contracting purpose Its compactness size and general handiness give it great advantages over the ordinary large cumbersome hoist and enable it to be easily moved around from one part of the job to another. Its capacity for work and general utility are unlimited.

Let us send you particulars of our Hoists and Mixers—or come and see them. Continuous Demonstrations at

WETTLAUFER BROTHERS

TORONTO

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Steelcrete
CONSOLIDATED

WHY

Steelcrete
TRADE MARK
CONSOLIDATED

Reinforcement is Superior to all Others

(12 REASONS)

Theoretical Considerations

(1) **It possesses a high elastic limit—not less than 55,000 lbs. per sq. in.** This is not attained at the sacrifice of quality or uniformity. "Steelcrete" is not a brittle and inferior steel but a tough, cold-drawn product with no equal in the market for uniformity of strength.

(2) **It provides against concentrated loads.** Its diamond shaped structure enables it to distribute the effect of a sudden local load over a great many strands.

(3) **Attains a perfect bond in the concrete.** This is due to its mesh shape which does not permit any slipping and there is no possibility of it.

(4) **Perfect distribution of Steel.** Every foot of width possesses the theoretical amount of steel. The accuracy here attained is impossible in loose rod reinforcement.

(5) **Longitudinal reinforcement.** "Steelcrete" mesh possesses strength in the longitudinal direction of the pipe equal to one third the strength in the circumferential direction.

(6) **Temperature stresses are guarded against.** The form of the mesh provides a positive reinforcement against these uncertain but definite stresses.

Practical Considerations

(7) **"Steelcrete" mesh is essentially a fool-proof reinforcement.** With the use of this material the man with the brains that designs the construction obtains an efficiency of 100 per cent. with ordinary every-day inspection and unskilled labour.

(8) **"Steelcrete" Mesh is a stiff reinforcement.** It holds its position in the forms in a way that no other mesh equals. It is far more important to have the reinforcement placed correctly in a vertical direction than in the horizontal.

(9) **It is cheaper to install.** Requires less labour than any other mesh or system of rods.

(10) **It is easy of inspection.** Only those who know "Steelcrete" know the trouble, delay and anxiety this saves to both contractor and engineer alike.

(11) **It can be placed quickly.** This means a saving in overhead charges. This feature has been overlooked by a great many engineers and architects in the past.

(12) **ALFRED ROGERS IS NOW CARRYING IN STOCK HALF MILLION SQUARE FEET OF "STEELCRETE" FOR IMMEDIATE DELIVERY.**

ROGERS

Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

ROGERS

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery—Send us your orders for crushed stone.

ROGERS

French Caen Stone Cement

Monarque Brand and Cementa-line. Rich in appearance and of unlimited durability—as good as natural stone—but cheaper. Full particulars on request.

Quotations made for all Work—Prompt Deliveries and Complete Shipments given from Stock

Alfred Rogers Limited

28 King St. West **Toronto, Ontario.**

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  Can. H. W. Johns-Manville Co.
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  Canadian Supply Company
  Metallic Roofing Co.
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  Paterson Mfg. Co.

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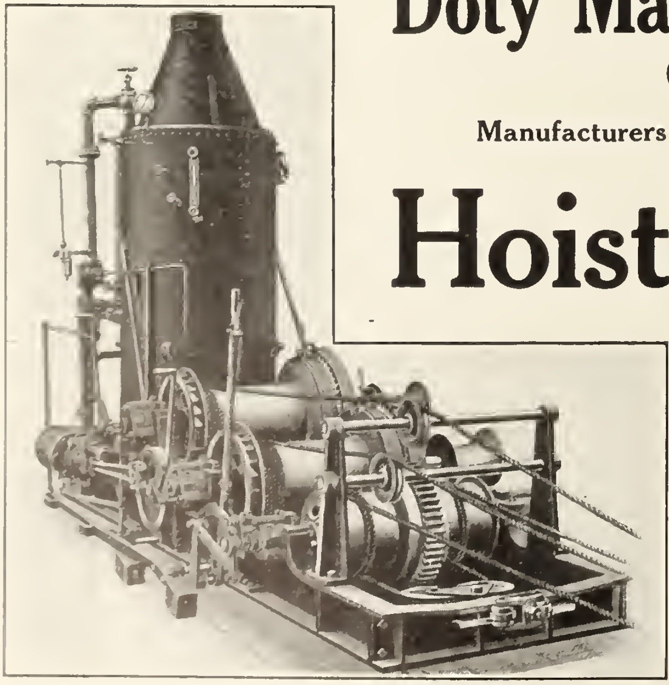
The
Doty Marine Engine & Boiler
Company Limited
Manufacturers of **Superior**
Hoisting Engines



This cut illustrated our Standard Double Cylinder Double Drum Hoisting Engine with Derrick Swinger attached. "Superior to any other on the market." All parts constructed, guages and templates and every engine tested under steam.

Derrick Swingers, Material Elevators, etc.
for
Contractors, Mines and Quarrymen

A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

Works—GODERICH, ONT.

To buy our Engines is a Guarantee of Satisfaction

Sawyer Belt will stand any weather

Exposure is the cause of many belting troubles. Neither leather or rubber belting, though expensive will stand both rain and shine.

Here is where **Sawyer Canvas Stitched Belt** shows its superiority. The compound in which it is immersed renders it pliable under all conditions.

It costs less—It wears more.

Try it in rain or shine

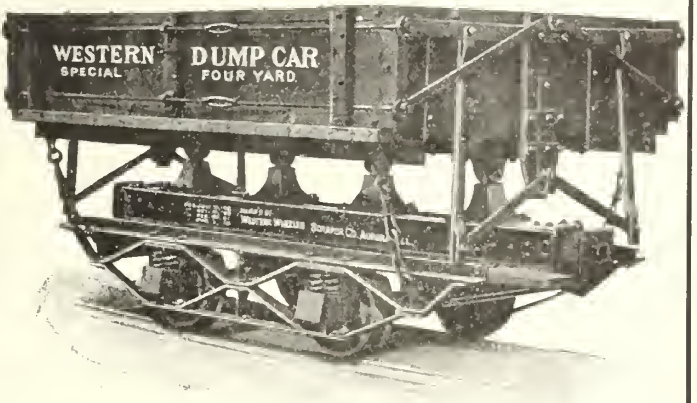
Sawyer Belting Co.

Cleveland, Ohio

The Contractor's Dump Car Without a Blemish

with the ability to do the hardest service is the

Western Special 4-Yard Car



All castings malleable, beds supported by four heavy pedestals and hinges; 20″ wheels; forged axles, M. . B. type with collars and dust guards; couplers broader and deeper, giving greater wearing surface and with yoke attachment; steel I-beam draft beam.

This car has also the celebrated Western features: pivotal doors, steep dumping angle, enabling it to be dumped easiest in shortest time, loose hinge construction, two springs over each journal, improved door construction. Not a detail neglected.

Our catalog describes the largest line of dump cars, earth and rock handling machinery made, Write for it.

Western Wheeled Scraper Company

Aurora - Illinois.

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS

1903	$ 0.00	1908	$ 93.26
1904	3.30	1909	200.46
1905	9.35	1910	14.07
1906	37.33	1911	2.29
1907	16.11		

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A Mile of Barrett Specification Roofs

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These buildings stretch for a mile along New York harbor. Their total roof area is 3,100,000 square feet more than seventy acres.

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3. They are not injured by steam, gases and acid fumes.

4 They are fire retardent and take the base rate of insurance

5. The net unit cost, that is, the cost per foot per year of service, is lower than that of any other type.

Although some of the buildings are fifteen years old, the roofing contractor states that the expense for maintenance of this entire roof has been less than $10.00. He estimates that if metal or ready roofings had been used, it would have been impossible to keep the buildings free from leaks and that the painting bill alone up to date would probably have amounted to at least $50,000.00.

We wrote to the Bush Terminal Company, asking what they thought about Barrett Specification Roofs. The Vice-President replied:

> "We use this kind of roofing because our experience has shown it to be the best and cheapest. Our analysis of first cost of application and cost of maintenance entitles us to speak with some measure of authority."

We shall be pleased to mail architects, engineers or owners of buildings copy of the Barrett Specifications with diagrams from which blue prints can be made. Address our nearest office.

SPECIAL NOTE

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired, however, the following is suggested.

ROOFING — Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified, and subject to the inspection requirements.

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September 5th, 1912

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The dredge Priestman is one of the best investments the Government could possibly have made in the general interest of the people of the country residing on the sea-board where harbors are becoming ruined through sand, silt and mud, etc. The dredge has already proved its efficiency here in St. John's at the head of the Harbor, near Bowring's premises, where it was worked for two or three weeks and where the removal of several hundred tons of mud, etc., made a fine dock deep enough for large vessels to haul in and which heretofore was so shallow that even small schooners could not go there at low tide The dredge will continue this work later in the season and will probably work in the harbor all the winter if not prevented by ice.

The Priestman is now at Newtown, Bonavista Bay, where her services are as badly needed as in any part of the Colony. Owing to the sand banks near the opening Newtown has for many years been a closed port to even schooners of thirty tons except at high tide. Large schooners and steamers calling there have been obliged to keep out in the offing and discharge their freight and take it in in boats. In about a month it is expected that the dredge will make a first class harbor of Newtown, so that ships of all sizes will be able to enter.

The services of the Priestman are also badly needed in several harbors on the South West Coast, notably Grand Bank, Fortune and Lamaline, where the shifting sands make such havoc with the ships channel. The dredge that was used there formerly did some service but her capacity was not the one-tenth of that of the new dredge and a good and permanent job was not made in any of those harbors. When the Priestman goes to work there it is confidently expected that she will do all that is desired and make those harbors first-class deep water ports fit for any schooner or coastal steamer to enter.

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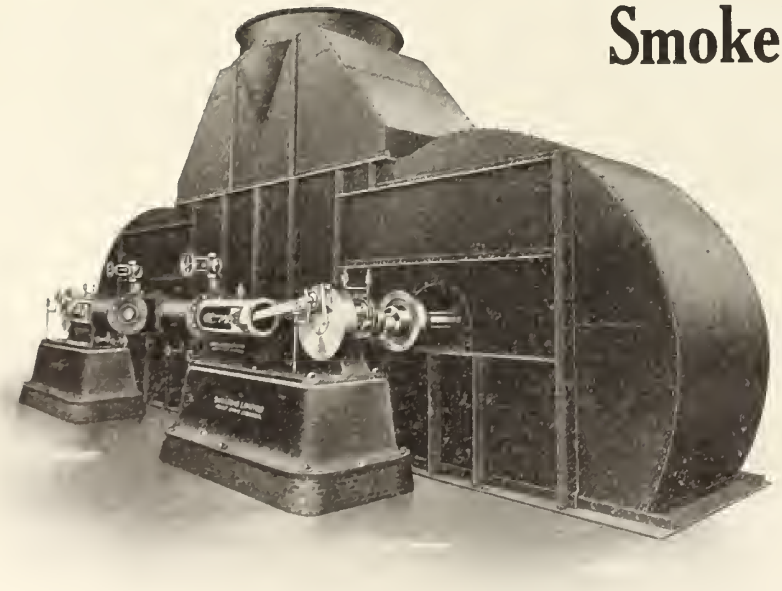

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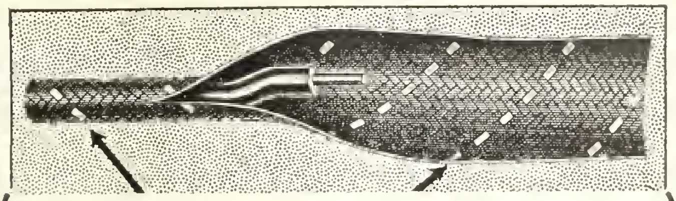

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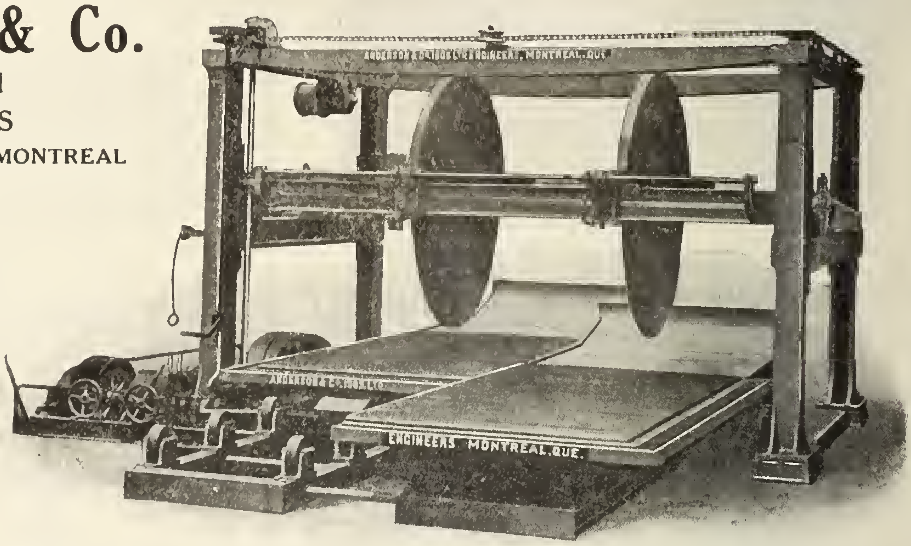

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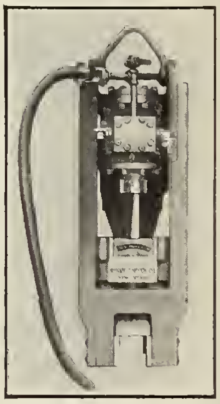

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Is the only manufactured stone which can be cut and dressed, to give the same appearance as NATURAL STONE.

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Architect, A. W. Holmes, Esq., Toronto. Corinthian Stone has proved to be the best for large buildings, is solid stone, no facing to peel or crack, which fact should be considered in connection with buildings such as above. Specify it.

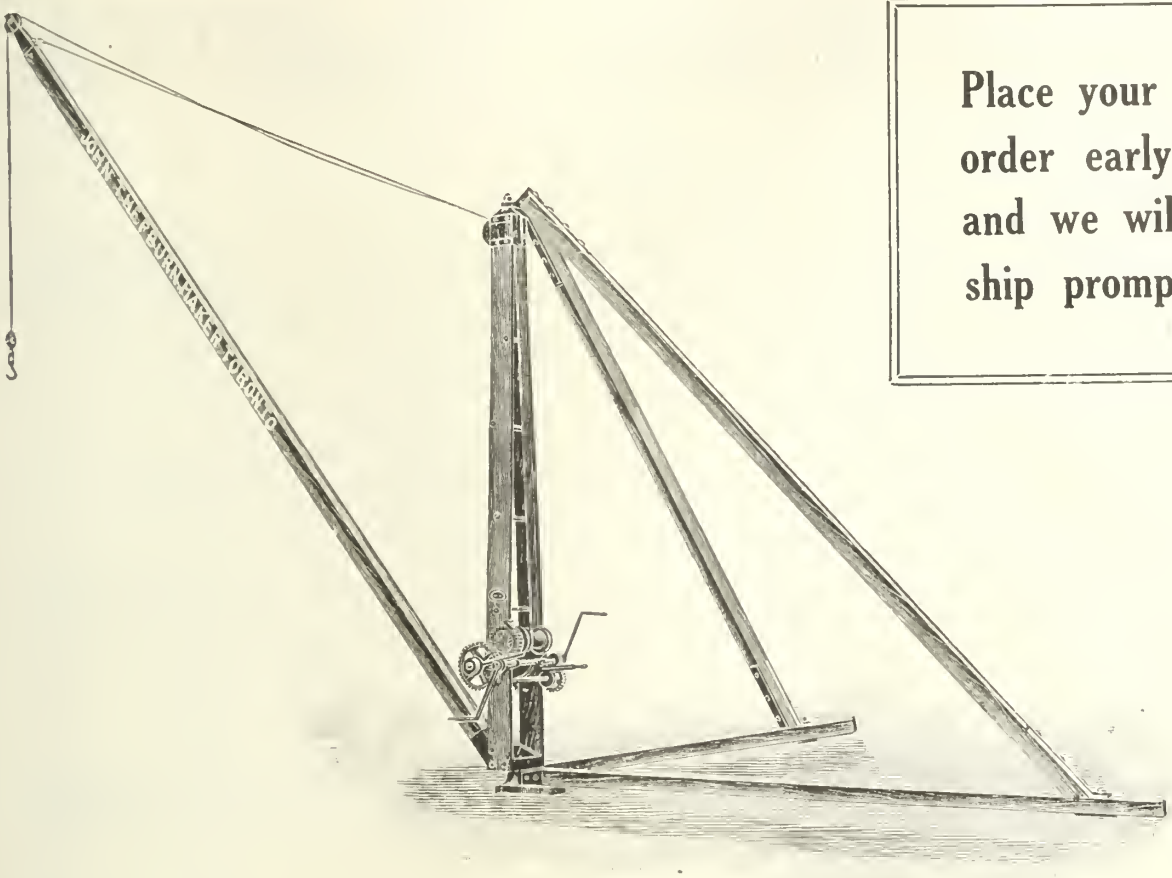
The Corinthian Stone Co.

OFFICE AND WORKS:
G. T. R. JUNCTION, GUELPH, ONT.

Agents at Ottawa: **Canadian Agency & Supply Co., 5 O'Connor St., Ottawa**

Agents at Toronto: **E. MacDonald & Sons, 176 King St. E., Toronto**

Place your order early and we will ship promptly.


JOHN T. HEPBURN MAKER TORONTO

The Proved Economy of Hepburn Scotch Derricks

If you cut the time upon a job and still do the job right, you are time and money in pocket. When you reduce labor by better methods and better equipment you also save time—and save money. You can get through more work, in less time, and at a better profit.

Hepburn Derricks represent bed-rock economy in construction work equipment.

They have weight where weight is needed. They have great strength. Yet every part is so well proportioned, so accurately and staunchly built, that a Hepburn Derrick is more easily operated and will do more work than any other derrick on the market.

Ask any man who has used them.

Made in standard sizes—one-half ton upwards. Interchangeable parts kept in stock for prompt shipment. Operated by hand or power. Fitted with single and double-purchase gears, band brake, and high-grade wire heaving rope. Interchangeable parts always in stock.

Iron Founder, Crane Builder and Machinist

JOHN T. HEPBURN

18-40 Van Horne St. Toronto, Can.

HARD WALL PLASTER

QUALITY

LYTHMORE CROWN ONTARIO
CANADA

SERVICE

White Gypsum - A Modern Plant - Experience

Building Material Dealers

Are you handling **Plaster**? If not, write us for particulars. If you are, can you afford to be without the **Highest Grade**? To make a **High Grade Gypsum Plaster**, three necessities are, 1st. **Pure Raw Material** (pure gypsum is white), 2nd. **Modern Equipment**, 3rd. **Experience.** We have combined all three with a mill of large capacity, new and up-to-date. Your order can be loaded **immediately** during any month in the year. Can you realize what this means to you? — **QUALITY** — **SERVICE**

Think it over

Crown Gypsum Company, Limited

Lythmore - Ontario - Canada

"Lead Wool"

is the best

jointing material

for spigot and faucet pipes for Gas and Water Mains.

Joints can be made in water without difficulty.

"Lead Wool"

joints are caulked cold, no melting whatever required.

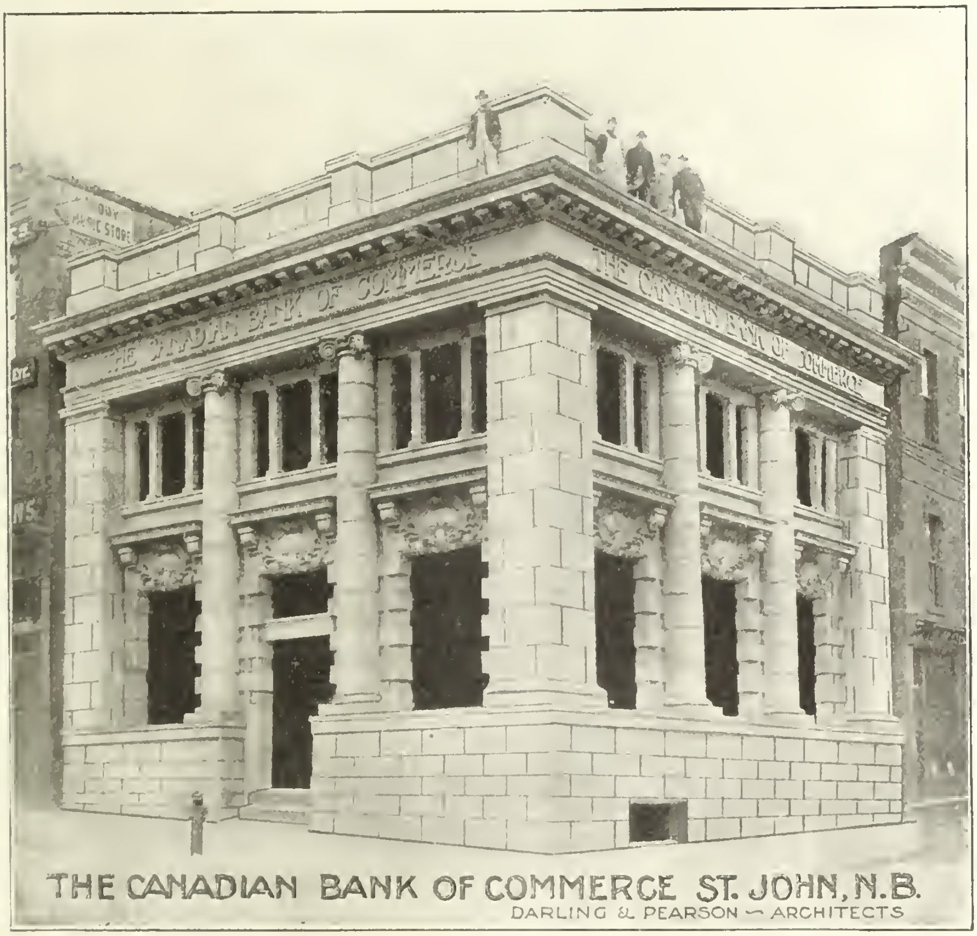
One ton of "Lead Wool" will make as many joints as two tons of pig lead.

Write for booklets and further particulars.

MUNDERLOH & CO., LIMITED, MONTREAL

Sole Agents for The Lead Wool Co., Limited

WE MAKE GOOD STONE



THE CANADIAN BANK OF COMMERCE ST. JOHN, N.B.
DARLING & PEARSON — ARCHITECTS

ROMAN STONE

is rapidly replacing imported Natural Stone for the highest class of buildings. It costs less and looks and lasts as well.

It can be cut and carved just like Natural Stone and has the additional great advantage of being reinforced.

Roman Stone is of uniform texture and hardens with age—it is the same quality all the way through—no veneer.

Roman Stone permits of artistic designs the cost of which would be prohibitive in Natural Stone.

THE ROMAN STONE CO., LTD.

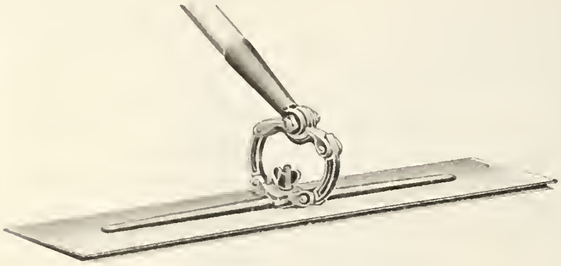
Business Office: 504 TEMPLE BUILDING, TORONTO, ONT.

Drafting Room, Foundry
and Stone Yard,
Weston, Ont.

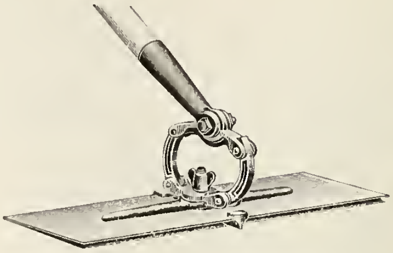
T. A. Morrison & Co.,
204 St. James St., Montreal
Sales Agents for Quebec

A Chance to Save

on Sidewalk Tools



"Abram" Trowel. Price $9,00



"Abram" Jointer. Price $8.00

"Abram" Edger. Price $6.00

Full Set: Trowel, Jointer, Edger, $21.00. Never sold for less in Canada

Here is a full set of ABRAM AUTOMATIC WRIST MOTION AND LONG HANDLED SIDEWALK FINISHING TOOLS. They will enable you to finish from eight hundred to one thousand square feet of walk per hour and without a back ache or sore knees, and you will do better work.

The above statement is being proved daily by hundreds of contractors—we will furnish the names and addresses of as many contractors as you wish.

Special Offer, 20% Off

We will allow 20 per cent. discount from the above prices on all orders for a full set we receive (cash with order) during the month of December, 1912.

15 per cent. discount on all orders (cash with order) received during the month of January, 1913.

Ten per cent. discount on all orders (cash with order) received during the month of February, 1913.

All shipments made on receipt of order, also the following guarantee:—Each purchaser may hold the tools until his sidewalk building begins next Spring, then give them ten days trial and if they are not satisfactory in every way they may be returned and the purchase price will be refunded.

What the offer means in cash to you

If we receive your order for a full set any time during December, you send us $16.80, cash saved $4.20.

Any time in January, 1913, you send us $17.85, cash saved $3.15

Any time in February, 1913, you send us $18.90, cash saved $2.10.

To each purchaser the guarantee of satisfaction after ten days' trial or money refunded on return of goods is hereby extended and made binding on us.

After March 1st, 1913

After this date no discounts and no trials will be allowed. Already in many sections Spring contracts are being awarded so why not take advantage of this remarkable offer now? You will buy Abram Tools later on at a higher price—why not get them now? You are losing money by paying two or three men for doing the work that can be done by one man with Abram Tools.

Preserve this copy of your "Contract Record" as this advertisement will not appear again, and no deviation will be made from the conditions of this offer.

A Few Words of Praise

"We are using two full sets of Abram Cement Sidewalk Finishing Tools and would not accept $100 per set if we could not duplicate them." Anton & La Blanc, Detroit, Mich.

"I have used a set of your sidewalk tools for the past season and only employ one finisher instead of three or four as was necessary by the old system. I would not be without them." D. Todd, Walkerville, Ont.

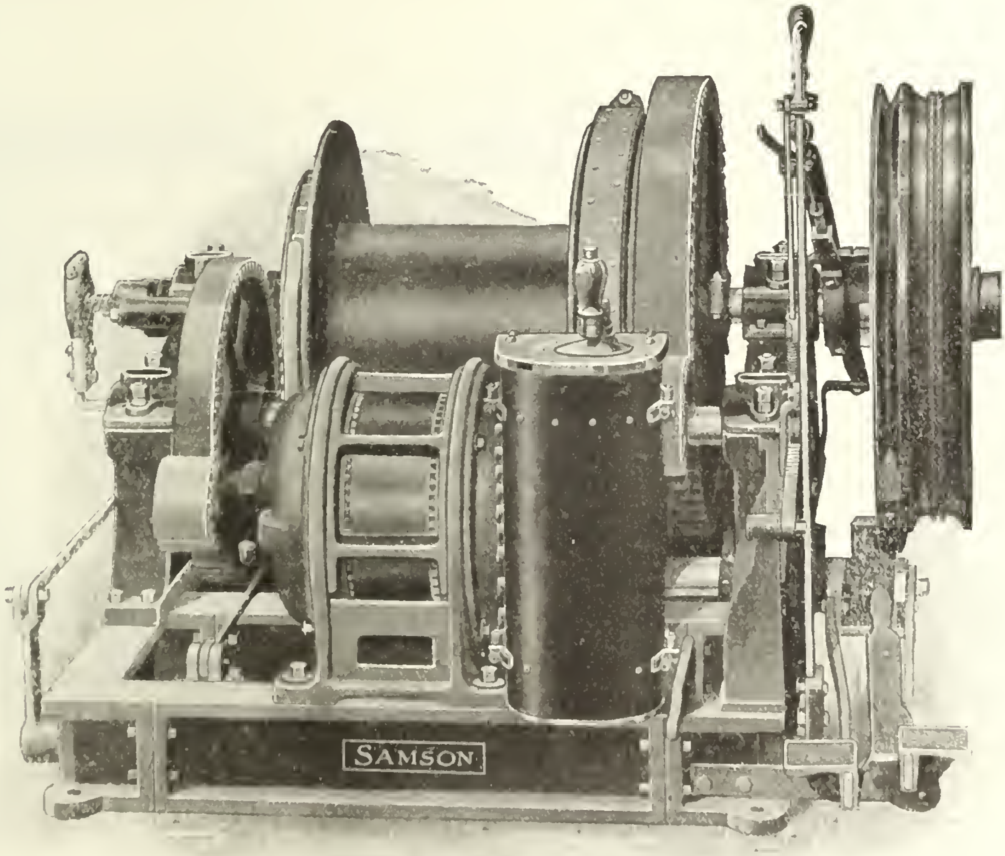
Our catalogue will be cheerfully sent free on request. Address all orders and make cheques and drafts payable to

Abram Cement Tool Co.

105 Ouellett Avenue
WINDSOR, ONTARIO

CONTRACTORS

Electric Hoisting Engines



Building Contractor's Electric Hoist with Material Elevator Sheave

Electric Hoisting Engines save the wages of one man.
They save power because power is only used while actually hoisting.
They also do away with coal, water, boiler and smoke troubles.
These machines are light, portable, powerful and convenient to operate. Being designed expressly for building contractors they embody some very desirable features. Specially designed hoist motors are used insuring continuous, reliable service.

DOUBLE AND TRIPLE DRUM ELECTRIC DERRICK HOISTS

CANADIAN INGERSOLL-RAND COMPANY
LIMITED
COMMERCIAL UNION BLDG. - MONTREAL, CAN.

MONTREAL COBALT WINNIPEG ROSSLAND
SYDNEY TORONTO SOUTH PORCUPINE LETHBRIDGE VANCOUVER

We make
20 lb. Section Rails
30 " " "
40 " " "
50 " " "

RAILS

300 Tons 30 lb. Rails ready for Shipment

We hold stocks of
20 lb. Fishplates
30 " "
40 " "
60 " Angle Bars
80 " " "

PROVINCIAL STEEL CO., LIMITED

COBOURG, ONTARIO

MERCHANT BARS

ROUNDS and SQUARES	FLATS	ANGLES
3/8 to 2-in.	3/4 x 1/8 to 4 x 1	3/4 x 1/8 to 2 1/2 x 1/2

Cold Twisted Squares for Concrete Re-inforcing made from New Steel Billets only.

Montreal Representatives: MERCHANT BARS, Gerald Lomer, Ltd., 43 St. Sacrament St. RAILS, F. H. Hopkins & Co. Imperial Bank Chambers
Toronto Representative: Mr. H. B. Holloway, 18 Wellington St., East.

The Steel Company of Canada Limited
Hamilton - Toronto - Montreal
Winnipeg

PLAIN ROUNDS,
& SQUARES,
COLD TWISTED
SQUARES

MAXWELL
DEFORMED BAR

STEEL BARS
for Reinforcing
Concrete

Dominion Steel Castings Company, Limited

Annual Capacity 12,000 Tons

Stock Process for Small Work
Acid Open Hearth for Heavy
Machinery Castings

Hamilton, Ontario

ELECTRICAL WIRES AND CABLES

in Copper and Aluminum

Copper Clad (Duplex Metal) Wire **Galvanized Steel Strand for Guys**

Canada Wire & Cable Co., Limited, 1170 Dundas St. TORONTO

Stock of Wire and Cable carried in TORONTO, MONTREAL and WINNIPEG

Sales Agents:
Roper, Clarke & Co., Ltd., MONTREAL
A. E. Esling, Scott Block, WINNIPEG
Macdonald, Marpole Co., Ltd., VANCOUVER
Gorman, Clancy & Grindley, Ltd., EDMONTON and CALGARY

Canada Steel Co., Limited

Hamilton, Ontario

(Independent of all mergers)

Manufacturers of **STEEL**

For Reinforcing Concrete.
Plain Rounds, Squares or Twisted Squares
Cross Arm Braces, plain and galvanized

ANGLES from ¾ x ¾ in. up to 2 x 2 ins. **ROUNDS and SQUARE** from ⅜ in. up to 1¼ ins.
FLATS from ¾ in. up to 4 ins. in width, and other special sections.

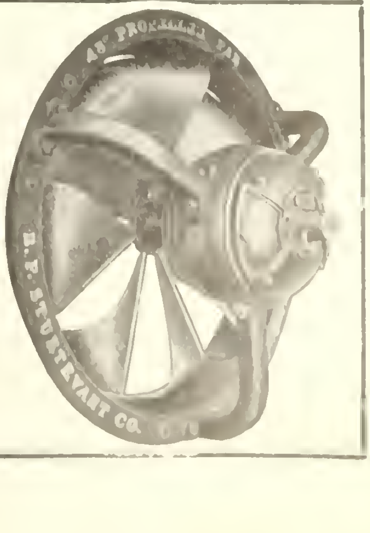
We can ship from stock

Ask for prices—they will interest you

Office and Works: Sherman Avenue North

Sturtevant Propeller Fans

REG. U. S. PAT. OFF.



For VENTILATING and COOLING

The design of our Propeller Fans is along the same scientific lines as all our fan product, and that is why Sturtevant Propeller Fans deliver more air for the same size fan and with less power expenditure than any other propeller type made. The construction is particularly strong and durable.

They will quickly change the air in factories, workrooms, kitchens, billiard halls, etc., carrying away the smoke, fumes, hot air, keeping the atmosphere sweet and cool.

The electric fans are equipped with motors wound for either alternating or direct current. *Ask for Bulletin No.* 116 Z.

B. F. STURTEVANT COMPANY OF CANADA, LIMITED

Office for Eastern Canada:
304-306 University St.,
MONTREAL.

Office for Central Canada:
Esplanade East,
TORONTO

Office for Western Canada:
405 Travellers Building,
WINNIPEG

FLEXIBLE COUPLINGS

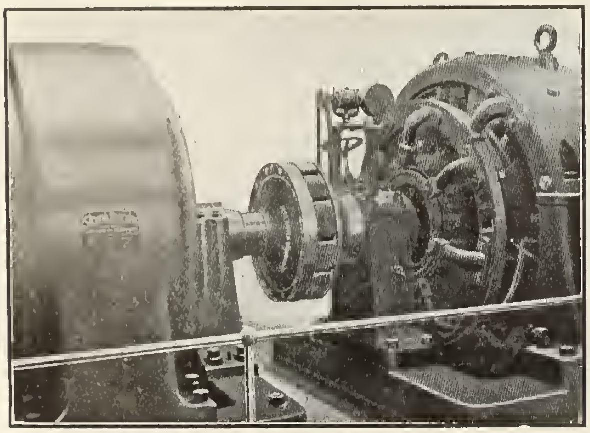
For High and Low Speeds

Save Power

Reduce
Running
Costs

Smooth Drive

Get Particulars from :



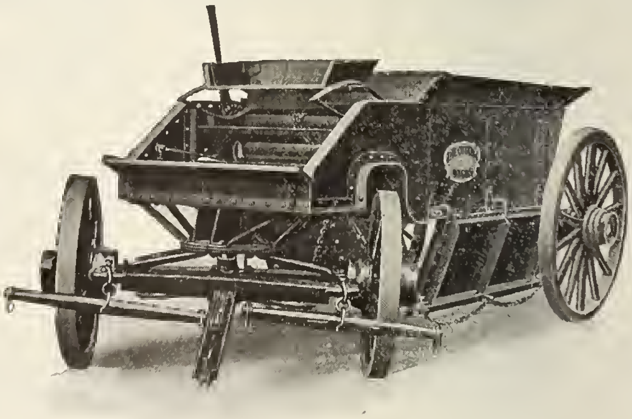
Suitable For

Centrifugal Pumps
Electric Motors and Fans
Steam Engines
and
General Power Transmission

The Canadian Boving Co., Ltd.

Vancouver Office, 427 Seymour Street.

164 Bay Street, TORONTO



Ottawa Steel Dump Waggons

are the latest development in Dump Waggons, and the original cost is no higher than inferior makes.

Strong, light, everlasting, first cost is last cost.

Let us demonstrate the superiority of this Dump Waggon over all others.

The General Supply Company of Canada, Ltd.

Ottawa Toronto Winnipeg

"Quality is Economy"
in Paving Brick

17 City Engineers

tell their good opinions about "Canton" Shale Paving Brick in a Booklet

"What Experts say about Metropolitan Paving Brick"

Write us for Booklet—It's Interesting

"Best Paving Block Made"

"Metropolitan Block"
Make Permanent Pavements

The Metropolitan Paving Brick Co. - - - Canton, Ohio, U. S. A.

The Thew Shovel for Road Construction

The general use of the Thew Shovel in road building and street grading is conclusive proof that it is adapted to the conditions, economical for the purpose and efficient in operation. The following list of some of the contractors, in the State of New York alone, who have used and are using The Thew No. O Full Circle Swing Shovel in this class of excavation will indicate the popularity of the machine and its undisputed merit on such work :

Joseph Walker, New Paltz, N.Y.
H. B. Sproul, Peekskill, N.Y.
S. B. Van Wagnen, Rondout, N.Y.
James E. Martin, Ploughkeepsie, N.Y.
F. G. Fowler Const. Co., Mt. Kisco, N.Y.
Brown & Lowe, Schenectady, N.Y.
Buckley Const. Co., Plattsburg, N.Y.
Newport Const. Co., Newport, N.Y.
Monroe Roads Co., Pittsford, N.Y.
Santanoni Const. Co., Newcomb, N.Y.
J. D. Moynehan Const. Co., Mohawk, N.Y.
Merritt Const. Co., Tuckahoe, N.Y.
Thos. Fitzgerald, Fredonia, N.Y.
Shanley-Morrissey, Inc. New York, N.Y.
M. F. Dollard, Albany, N.Y.
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Jos. F. Stabell Co., Buffalo, N.Y.
Thos. Brown Const. Co., Buffalo, N.Y.
A. J. Rockwood, Rochester, N.Y.
F. C. Humeston, Brooklyn, N.Y.
H. P. Burgard, Buffalo, N.Y.
Eastern Concrete Steel Co., Buffalo, N.Y.
W. J. Burns Co., Rochester, N.Y.
Whitmore, Ranber & Vicinus, Rochester. N.Y.
James Garafano & Sons, Mt. Vernon, N.Y.
Cunningham-Woodard Co., Hudson Falls, N.Y.
F. A. Brotsch, Jr., Rochester, N.Y

The Thew Shovel is popular because it can do the work.

There is no other shovel of equal weight and dipper capacity that can handle as difficult material, nor, under equal conditions, as large an output as the No. O Thew.

Investigate the Thew Horizontal Crowding Motion.

Write for Catalog and Information

THE THEW AUTOMATIC SHOVEL CO., Lorain, Ohio

---

for Highest Efficiency, Absolute Reliability, Greatest Economy

Used by the Largest Mining Companies and Hydro-Electric Plants.
Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.

Sizes 3 to 42" Diameter up to ¼" in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

Write for our Catalogue 5 A and prices on your requirements

AMERICAN SPIRAL PIPE WORKS - MAIN OFFICE CHICAGO
NEW YORK OFFICE 50 Church Street

Kahn System Steel Sash

Gives You

Light — Ventilation — Fire Protection
Strength — Rigidity — Weatherproofness

Brigdens Limited, Toronto

Special Sash features: Steel Glazing Clips, attached. Solid Bronze Hinges, noncorrosive. Double Contact Ventilators.

Some new KAHN Products just Marketed

KAHN Steel Expansion Joints for Concrete Roadways.
KAHN Steel Springs.

Other KAHN products include

Kahn Truss Bars for reinforcing concrete, Rib Bars, Hy-Rib, Rib Metal and Trus-Con Chemical Products for waterproofing and finishing concrete.

Kahn System Steel Sash used in the following Toronto buildings, Hydro Electric Laboratory and Storehouse, Smith Manufacturing Company, Limited, factory, Keene Manufacturing Company, factory, Langmuir Manufacturing Company, of Canada, Limited, factory, H. P. Eckhardt & Company, warehouse, Gutta Percha Rubber & Manufacturing Company, of Toronto, factory, Brigdens Limited, Printing and Engraving Building, Dominion Paper Box Company, factory, Massey-Harris, warehouse.

Kahn Sash can be manufactured to any size with the required amount of ventilation.

Trussed Concrete Steel Co., of Canada, Limited

Head Office and Works: **WALKERVILLE, ONT.** *Branches:* **Toronto, Montreal, Winnipeg, Vancouver**

AMERICAN STEEL & WIRE CO.'S
TRIANGLE MESH
CONCRETE REINFORCEMENT

Manufactured from

Cold Drawn Steel Wire

Tensile strength 85,000 lbs. per sq. inch.

Every wire tested for its entire length by process of manufacture.

Furnished in rolls 150, 300 and 600 feet long.

No material wasted by lapping short lengths.

United States Steel Products Co. 30 Church Street,
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Exporters of the Products of American Steel and Wire Company

Canadian Offices:
United States Steel Products Co. - - Bank of Ottawa Building, Montreal
" " " " " - - - Nicholls Building, Toronto
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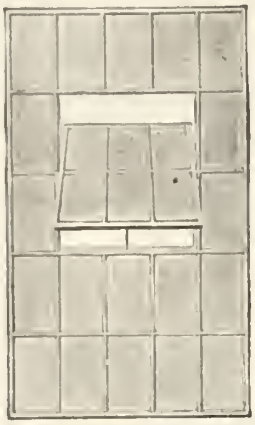
For Engineers' Handbook, Slide rule and full details regarding Prices and LOCAL STOCK ON HAND, address any of above offices

Ormsby-Lupton Steel Sash



Our Sash is made of miter-joint construction, giving you the neatest appearing Steel Sash on the market.

The joint is locked on the horizontal bar, making the Ormsby-Lupton Steel the strongest.

Our Vents are made and hung by expert vent hangers, thereby dispensing with wind, rain and any other elements.

WE SATISFY OUR CLIENTS

Steel Sash will give you the maximum light and perfect ventilation. We are prepared at all times to submit any suggestions in designing your windows.

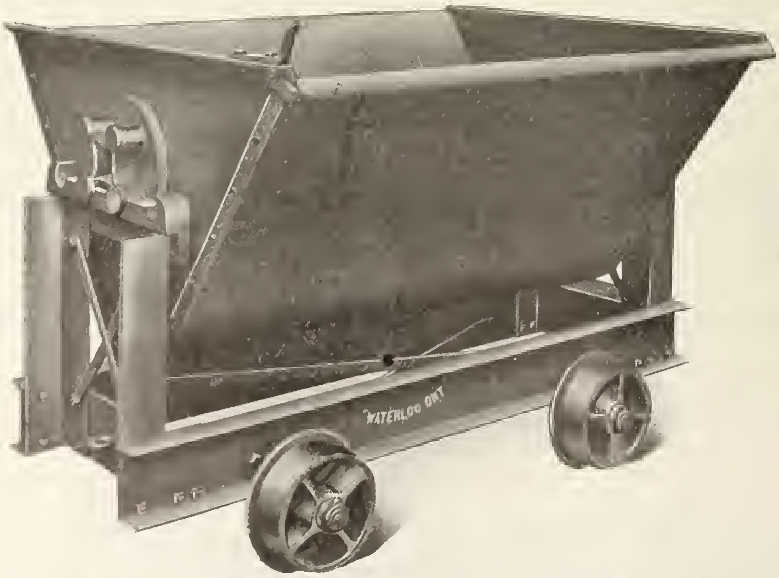
MANUFACTURED BY

A. B. ORMSBY, Limited

REPRESENTATIVES: General Contractors' Supply Co., Halifax, Stinson-Reeb Builders' Supply Co., Montreal, Canadian Agency & Supply Co., Ottawa, C. H. Abbott Agency and Supply Co., Regina, Robt. S. Sclanders, Saskatoon, C. H. Webster, Calgary, Walker & Barnes, Edmonton, Evans, Coleman and Evans, Vancouver and Victoria.

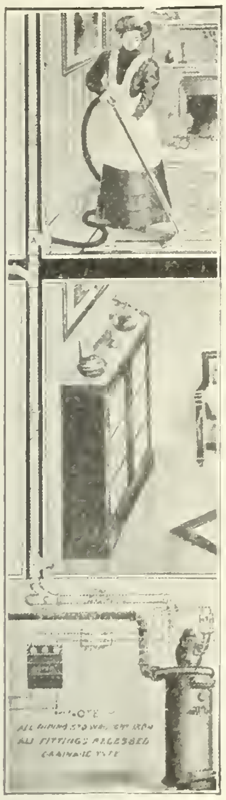
Canadian Made Steel Dump Cars

Simplest, Strongest, Best We make 'em in any size or gauge



We also make **Winding Drums and Portable Track**

Bechtels Limited **Waterloo, Ont.**



House Installation

TUEC

Stationary Air Cleaning System

Simple Efficient Economical Durable

Two bearings only, both Skefko (the latest ball bearing).
No gearing.
Compact unit, minimum of space and headroom.
No sliding metal surfaces in contact.
Direct connected unit — only one moving element.
Highest volume of air per horse power consumed.
Large tools — therefore quick cleaning.
Large 2½ inch piping — no clogging troubles.
Built in all styles and sizes for homes, theatres, apartments, office buildings, factories, clubs, hospitals, churches, etc.
Built in largest plant in the world devoted exclusively to the manufacture of Stationary Vacuum Cleaners.
Endorsed by such eminent Engineers as Henry Ford and Howard E. Coffin.
Over 4000 installations up to November 1, 1912.

Send to Nearest Agency for Catalogue A.

Canadian Representatives:

Tuec Co. of Winnipeg,
419 Portage Ave.,
WINNIPEG, MAN.

Tuec Co. of Calgary,
812 First St. W.,
CALGARY, ALTA.

James J. Martindale,
112 Mail Building,
TORONTO, ONT.

A. P. BURY, 115 St. Nicholas Bldg., MONTREAL, QUE.

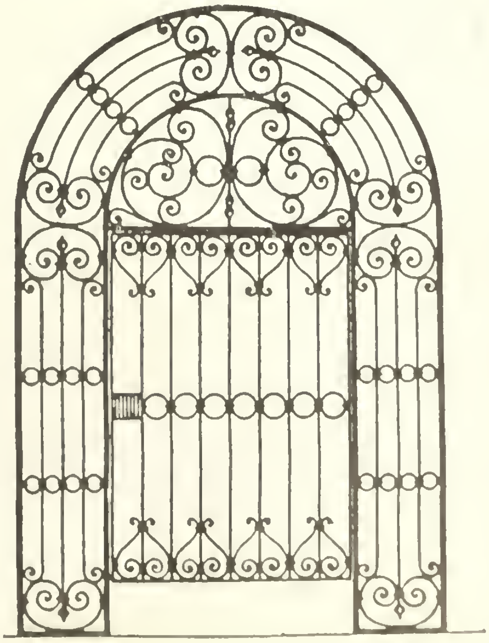
Dominion Ornamental Iron Co., Limited

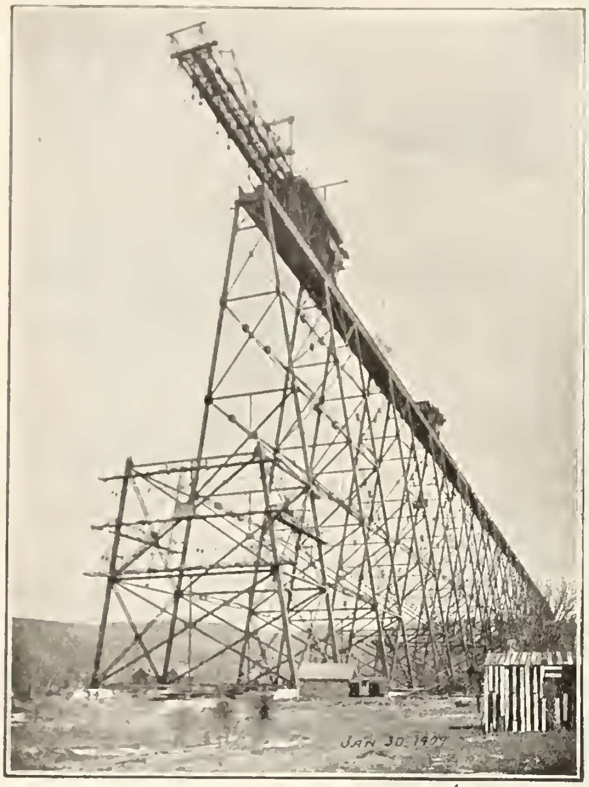
1195 Queen Street East, TORONTO

PHONE BEACH 1192

MANUFACTURERS OF

Stairways in Wrought and Cast Iron
Fire Escapes
Elevator Enclosures
Marquise and Canopies
Bank Counter Screens
Fences and Gates
Balconies Window Grills
Lamps and Brackets
Light Structural Iron Work





Outlook Bridge on the C. P. R. built by the Canadian Bridge Company who in common with the other large bridge builders have found Beatty Hoists thoroughly reliable for this trying service.

"Beatty Hoists"

STEAM and ELECTRIC

Have stood the test of time and given satisfaction wherever they have been placed.

Ask the man who has one.

We have shipped Engines into almost every part of the Dominion and will gladly put you in touch with our nearest customer.

Can furnish any size or type and give prompt shipment.

We also build Dredges, Steel Scows, Centrifugal Pumps, Derricks, Derrick Irons, etc., and are sole Canadian makers of the **Williams "Faivrette" Clamshell Buckets.**

M. Beatty & Sons, Limited

Welland, Canada

AGENTS
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H. E. Plant, 1790 St. James St., Montreal, Que.
H. W. Petrie, Limited, Toronto, Ont.
Dominion Equipment & Supply Co., Winnipeg, Man.
R. Hamilton & Co., Vancouver, B. C.

Block Stone, Dimensions, Random, Head Sills, Shoddy, Stone Sawing

Sackville Freestone Co., Limited, Sackville, N. B.

WRITE US FOR QUOTATIONS

A Belt Which Conveys ALL the Power

Practical men know the drainage of power from a slipping belt, ***and because they know,*** they are buying

GOODYEAR RUBBER BELTING

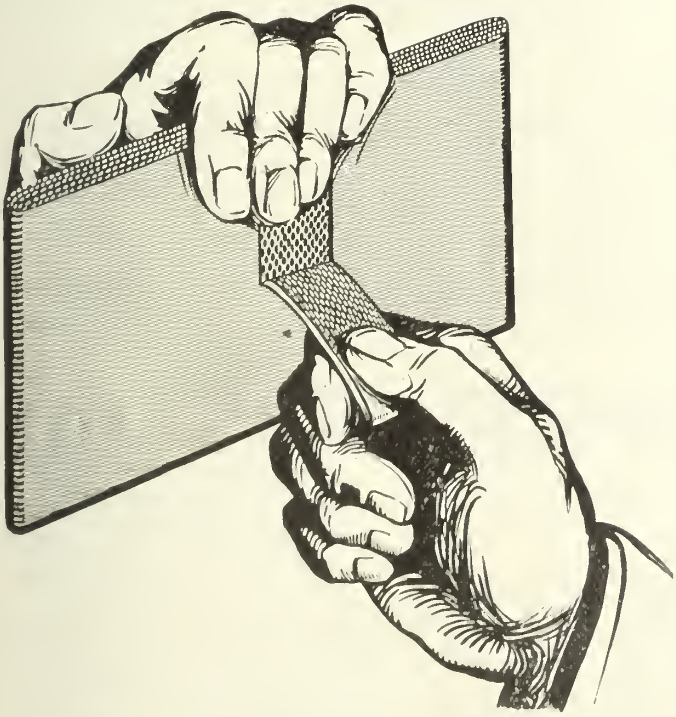
Which Neither Slips Nor Stretches

It is built up, layer upon layer, of close-woven, long-fibre, cotton fabric, rubberized and cured under Goodyear processes. And every Goodyear belt has in it the lowest possible minimum ot stretch, because the belt is "cured" whilst stretched to the limit of safety in a special machine.

That is the Goodyear Method of Belt Manufacture

And the result is entirely satisfactory to belt users—a fact to which our enormously increased sales testify. What is the significance of this CONTINUED SALES INCREASE—50% over last year? Simply that Goodyear Belting more than fulfills the claims made for it by the Goodyear people—who know what a belt should do, and make a belt to do it.

It has cost us less than $200.00 for claims or adjustment of every kind in connection with our total output for the past two years—a remarkable tribute to Goodyear reliability.



Look into the Belt for Yourself—Try to Tear it Apart.

Make a cut in the top layer—and then try to pull it apart. You will get a faint idea of its strength.

That is the result of forcing rubber at a tremendous pressure through the fine cotton fabric—separating every strand—thus abolishing all internal friction or grinding. Whilst these layers of fabric are afterwards so compressed as to be almost homogeneous, the finished belt bends easily, the "duck" being so woven as to retain complete pliability in the finished belt.

For Main Drives and High Speed Pulleys GOODYEAR Belting is the Best

It has all the tensile strength necessary to absorb tremendous strain without slip, stretch or rent. The grip of rubber and the prodigious strength of hard-twist cotton fabric are united, and prove equal to every emergency.

Where the power transmitted is high, and great tensile strength is essential, Goodyear Rubber Belting proves its worth.

EVERY GOODYEAR BELT IS SUBJECTED TO A STRINGENT TEST BEFORE LEAVING THE FACTORY, and what is more, the materials used in the manufacture are also tested in the Goodyear laboratory before using.

IF YOU USE A BELT AT ALL IT WILL PAY YOU TO USE A GOODYEAR

Loss of power is loss of profit—and an inferior belt is dropping power all the time. Goodyear belting quickly earns its cost in power saved and trouble avoided.

TWO HUNDRED AND FORTY ROLLS—A TOTAL OF 72,000 FEET

We have just received an order for this quantity of GOODYEAR RUBBER BELTING from one business concern in the west, for the equipment of interior elevators. Such an order shows supreme confidence in the quality of GOODYEAR Belting.

If we have not just the belt you require we will make it for you.

In the choosing of belts our booklet would be of great assistance to you. We supply it free. Write to our nearest branch for one.

The Goodyear Tire and Rubber Company of Canada, Limited

Factory, Bowmanville, Canada

BRANCHES: Victoria, B.C. Vancouver, B.C Calgary, Alta. Regina, Sask. Winnipeg, Man. London, Ont.
Hamilton, Ont. Toronto, Ont. Montreal, Que. St. John, N.B.

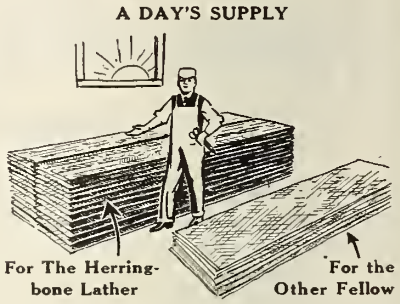
Herringbone Lath, Best by Test

THIS or THIS
Something of a stunt for wet mortar

Examine the Herringbone ribs. They are the joists that stiffen the Herringbone Fabric. They turn excess plaster back on the Trowel. They prevent the clinch from dropping off. They save cost in plastering.

Herringbone is self furring

The longitudinal ribs act as furring ribs. The transverse strands are NOT against the backing. The lath is fully enveloped in mortar. Furring strips are not essential. Furring strips cost nine cents per square yard.



Herringbone requires no laps

Herringbone sheets have lock selvage edges. They have 1 ½ inches end lap. Herringbone lath lays up net as billed. No material is wasted in side joints. No material is wasted on account of crooked edges. You don't pay for the end joints.

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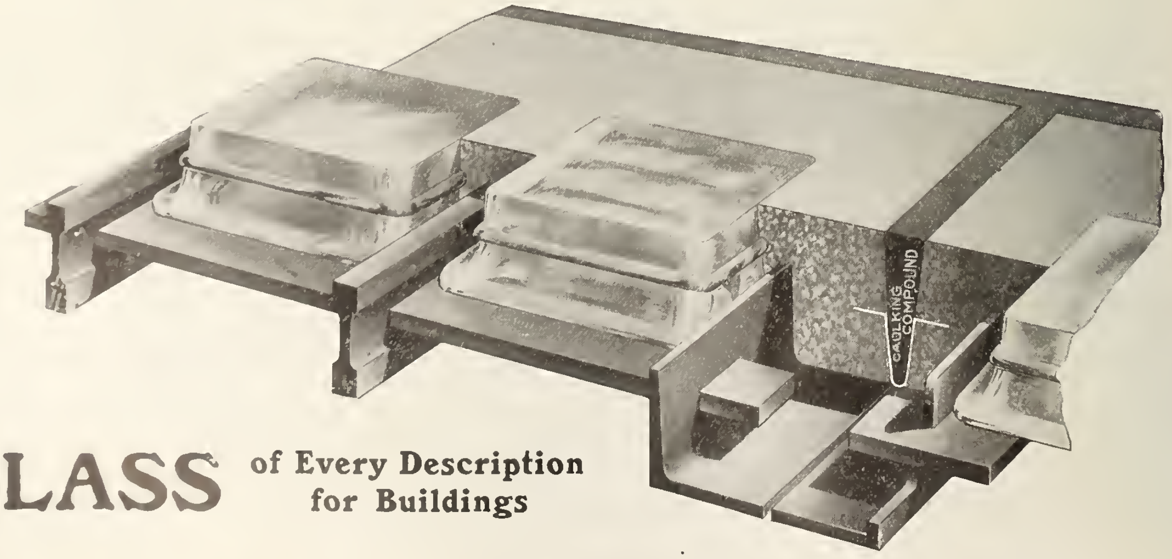

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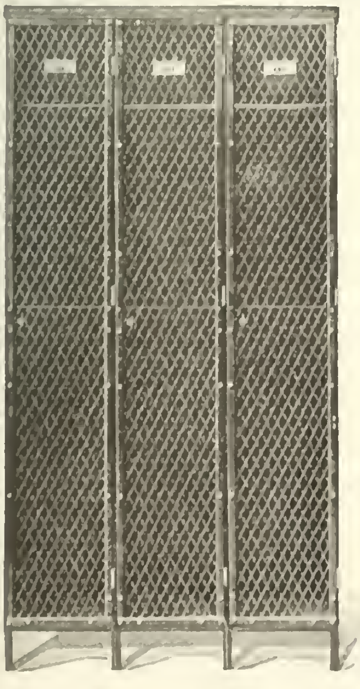

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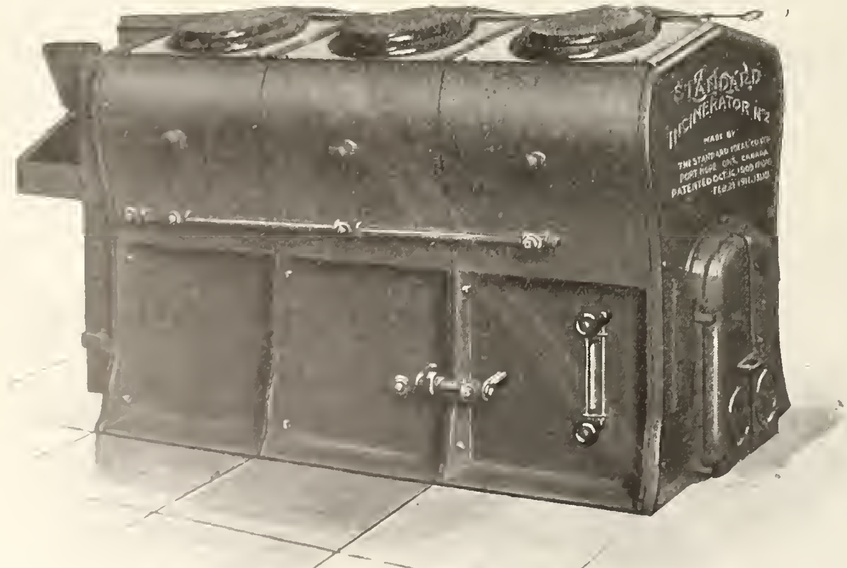

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The Engineer and the Architect

OF recent years there has developed a close connection between engineering and architecture. These two closely allied professions are more and more inclined to overlap one another.

As a matter of fact the distinction between them is only a comparatively modern one, and as the necessity for it fades away, so also dissolves the sharp division between these twin branches of the constructional profession. Only about two hundred years ago, approximately, was there any clear difference recognized between the civil engineer's work and the architect's. This distinction arose from the necessities of the time. The architects at that period were steeped in old tradition. Their only aim was to copy faithfully the historic structures of the past without regard to the progress of humanity in sanitary knowledge, heedless, too, of the new problems which advancing civilization has to solve. Engineering at first went off at a tangent from this, and aimed in its structures at mere utility, disregarding entirely the question of beauty or artistic effect. Now, however, architects have awakened to the appreciation of modern methods and materials of construction, and adapt themselves more to the spirit of the age, while engineers recognize that the artistic standpoint must be considered by them as well as the utilitarian.

There are many branches of work in which the two could work hand in hand for the benefit of all concerned. Town planning, for instance, is a science in which the collaboration of both is essential to success:—the engineer superintending all works—sewerage, water, streets, etc.—the architect designing public buildings, and working for the artistic beauty of the whole. Even in big public buildings the best result would be obtained by both working together. Take the case of a hospital:—there the architect would be aided by the engineer in matters of heating, ventilation and so on. Other works there are which might be undertaken arbitrarily either by the architect or the engineer, and it is often a moot-point as to which shall be given the undertaking. It is only indeed the question of custom that has decided what sort of construction shall be given to the one and what to the other. This approximation and union of forces is a factor which both architects and engineers should welcome. It is a proof of the triumph of reason over prejudice. It tends to more broadmindedness, and practically doubles the field of operation in both branches.

Fire Precautions and Building

WHATEVER may be the defects in the civic administration of Montreal, it is in the van so far as its fire brigade is concerned. The chief, Mr. E. Tremblay, is recognized as an authority on fire protection, and especially as an advocate of the rigid enforcement of preventive measures. He believes that it is wiser to take measures to prevent fires than to spend large sums on extinguishing them. In an exhaustive letter Mr. Tremblay compares the fire losses in Canada and the United States with those in European countries, and emphasizes the fact that whereas in the former it costs $3 per capita yearly, in European countries the loss is only 33 cents. On the North American continent maintenance costs $1.25 per capita, and in Europe the expenditure is only 50 cents, but in spite of our heavy outlay the fire loss is eight times greater than in Europe. Canada alone loses every year over 20 million dollars by fire.

The fact is, we have devoted our energies to improving methods of extinguishing fires without giving the same attention to the prevention of them. Speculation in insurance and incendiarism are among the causes of the large number of fires, and improper building is also a fruitful source of fire waste. Buildings are run up in a hurry, and are made to look very attractive, both inside and out, but the most important safeguards against fire are completely ignored. No effort is made to comply with the dictates of common prudence.

The chief architects in Montreal are of opinion that so far as the city is concerned the building laws are utterly inadequate, in the matter of fire prevention, and the committee which have just compiled the draft of a new code of laws made special regulations to remedy these undoubted defects. But the question is of more than local importance, and Mr. Tremblay's suggestions are worthy of the consideration of those engaged in the contracting and engineering trades and of civic officials. Mr. Tremblay is of opinion that when a person is about to construct a building, he should be obliged to submit his plans and specifications to the building inspector for approval, filing a copy with the inspection department, as a record. Then it should be seen to that the building is constructed according to the plans and specifications so approved, and if at any time it should appear that the building was not so constructed, the department should have power to order its demolition. Mr. Tremblay goes a step further, and believes that if a fire occurred in such a building, and it was found that the fire was caused by the fact that the building was not constructed in compliance with the by-laws and the plans and specifications approved by the building in spector's department, the proprietor should lose the insurance he carried on the building. The building by-laws should also be radically reformed along the lines of the laws of some of the large European cities, which have made a special study of fire prevention for years.

Fifty per cent. of the fires are preventable, and Mr. Tremblay would fine or imprison those shown to be responsible, by neglect or carelessness, for a fire. The enforcement of proper laws should be by means of a fire commissioners' court, which would investigate all fires and fine or imprison all persons who disobeyed the law. Further it is the duty of the Provincial Governments to establish bureaus of fire prevention, whose functions shall be to teach the public how to prevent and stop fires and survey the fire question generally throughout the provinces. These are practical suggestions from a man who has wide experience, and who has tried, so far as circumstances will allow, to put preventive measures into force.

Engineering and Common Sense in the Building of Highways

By L. S. Bruner, A.M. Can. Soc. C E.[*]

SEVERAL years ago Mr. Wm. Kent, M. E., author of Kent's Mechanical Engineers' Pocket Book, gave an address on "Engineering and Common Sense." He gave his definition of Engineering as "the science of overcoming the forces of nature and of human nature." He further stated that of these two sets of forces, human nature was the harder to overcome and illustrated it by the following story.

In olden times it was the custom, in sending grain to the mill, to fill a large bag and place this on the back of a donkey, a small boy walking alongside and holding the bag in place. This custom was followed for a long time until one day a philosopher happened to meet a boy so engaged. He stopped him and said, "My son, why don't you make a long bag and put grain in one end and a stone in the other and sling it across the donkey's back? In this way the bag would not have to be held on and your work would be that much easier."

Now this appealed to the boy's sense of laziness so he followed the suggestion. And this method came into general use and was followed for generations. But one day another philosopher met one of these boys and said, "My son, why don't you take out that stone and fill both ends of the bag with grain? You could then carry twice as much grain without increasing the work of the donkey." This plan, however, did not reduce the boy's work. It only meant a change in the established order of doing things, so the boy replied, "This way was good enough for my father and my father's father and it's good enough for me." So he went his way in the time-honored fashion. To-day human nature is much the same as it was thousands of years ago. We are all too prone to think that what was good enough for our fathers is good enough for us.

This same principle applies to roads, for every day we see people taking the stand that the older forms of road-building are the best because they always have been the best. We have been taught to believe that water-bound macadam is the only suitable material for rural highways. And this belief is still adhered to, in many places, in spite of the fact that we daily see them going to pieces under the present day traffic.

Let us investigate some of the causes of the failure of a macadam road, and how the destruction of our highways can be prevented. It is a well-known fact that macadam surfaces have rutted under heavy loads. This is especially true where there is much automobile traffic, and this class of traffic follows the better roads, so that in improving the highways this cause of failure must be guarded against.

In ordinary traffic, such as trucking, it is evident that a certain amount of shearing stress must occur in the pavement. Macadam has a relatively small shearing strength, with the result that in time it fails under this form of loading. A fast moving automobile does two things. It sucks out the binder, upon which the life of the road depends, and distributes it as dust over the surrounding landscape. But there is another force acting here. The rear wheels, in driving the car forward, exert a horizontal thrust on the stones, loosening them in their position and in a short time forcing them entirely out of place, leaving them lying loose upon the road and causing a hole. This action is accelerated by traffic following the same track. This is on account of the high crown necessary for surface drainage, and as a result all vehicles travel in the centre of the road so as to be horizontal transversely. There is another cause of failure which results from the low shearing strength. If the road is poorly drained and the sub-grade becomes moist, the stones above the soft spot will be forced into the mud which will in time work up to the surface.

The question that naturally arises is, "How can we prevent these forms of failure?" And the answer is equally obvious. "By adopting a material which has the strength to withstand them." But what shall that material be? It is necessary to incorporate some material which will hold the stones firmly in place. Various oil and tar mixtures were tried but still the work of destruction went on, unless continual watch was kept for the first signs of failure, and repairs immediately made. The tar binder, while an improvement, has not sufficient strength in itself to resist these forces and in time it loses that little strength it has.

Then one day a philosopher came along just as with the boy and his sack of grain, and said, "Why not use cement as a binder and build a concrete road? Concrete has sufficient strength and instead of decreasing in strength as time goes by, it actually grows stronger. It is durable, for we are familiar with all kinds of concrete structures which are as lasting as time itself. Not only is this so but we can look back into history, to the time of the Romans, and find that they built roads of concrete, which are some of the best roads that have ever been built. And if the Romans, with their varying natural cement, could build such durable roads, why can't we, with our present Portland cement which is uniform and many times better, have just as great and even greater success"?

And so the concrete road has come into existence. But let us put it to the same tests that we have applied to macadam. Cement concrete has a relatively high shearing strength in comparison with all other road materials. In fact it is strong enough to support any normal load which can come upon a road surface. Automobiles cannot suck out this binder for its adhesive strength is many times greater than any suction which could be produced in this manner. This same strength prevents the loosening of stones so that the road surface is preserved in its original condition. On account of the absence of obstructions to the run-off of surface water, a much smaller crown can be used. This distributes the traffic over the entire surface instead of confining it to one track, so that even though the traffic on the concrete road, as a whole, is greater, on any one portion it is much less, hence it does not get the continual wear.

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[*] Publicity Manager, Canada Cement Company, Limited.

In the design of concrete bridge floors it is generally assumed that normal pressures are transmitted through the concrete in lines of pressure whose surface is a cone with elements at 45 degrees. It scarcely needs demonstrating that the same assumption cannot hold for macadam. In other words, the pressure cannot be distributed over nearly as large an area as it can with concrete. This fact has added importance when the possibility of a soft spot in the sub-grade is considered. For individual stones cannot be forced into the mud below on account of the road being a solid matrix. The concrete might even be conceived as acting as a beam in bridging such a spot, should one occur. Moreover, concrete properly made will shed water readily and prevent it from soaking through to the sub-grade. Hence there is less likelihood of the formation of mud under the paving material.

Concrete Fills Requirements

The above reasons are based on scientific facts. The following are advantages from an economical and practical viewpoint. The qualities most desired in a road are (1) Low in first cost, (2) Easily and cheaply maintained, (3) Smooth and hard, so as to offer the least resistance to traffic, (4) Easily cleaned, (5) No dust or mud, (6) Non-absorbent, (7) Not slippery, (8) Comfortable for driving, (9) Noiseless, (10) No glare.

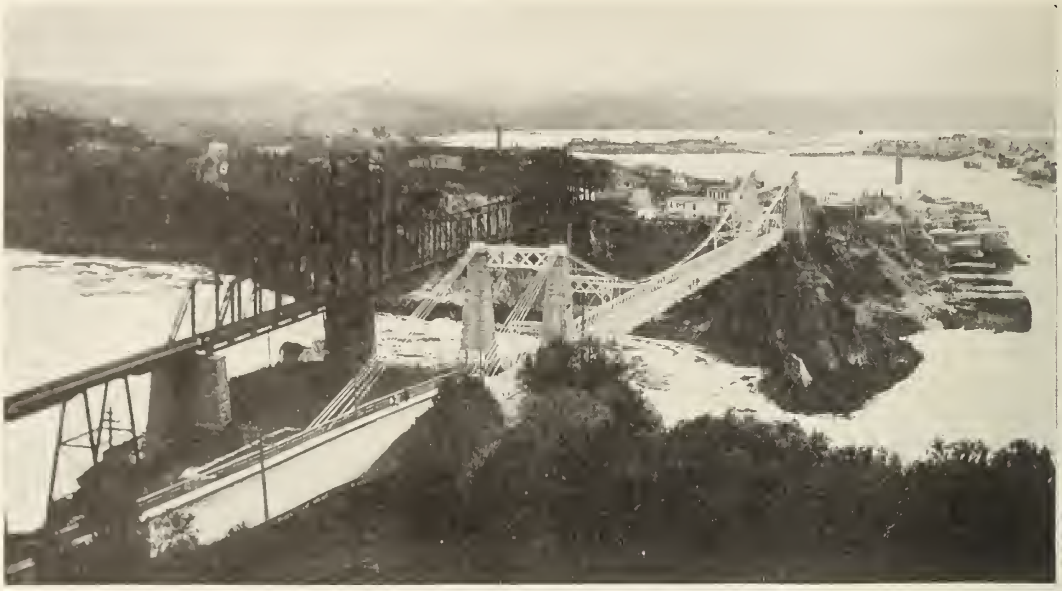
Concrete fulfills these conditions better than any other form of construction. It is low in first cost, lower than any other form of permanent pavement, about the same as tar-bound macadam and very little more than a properly built water bound macadam. The reasons given above for using concrete also show that its maintenance should be very little if anything at all. That it is low in tractive resistance, easily cleaned, not dust producing, non-absorbent and comfortable to drive upon, is self evident. The degree of slipperiness depends on the finish. But with the use of a wooden float or a broom, the surface can be roughened sufficiently to prevent the slipping of horses or the skidding of automobiles. In this respect, it is the general concensus of opinion, amongst teamsters' unions, that concrete is entirely satisfactory. It compares favorably with sheet asphalt in regard to noise and is quieter than brick, but any hard surface road will produce a certain amount of noise, even macadam. If desired, the glare can be eliminated by the use of lamp black; but when asked if he had ever tired this, Mr. Hines, one of the Road Commissioners of Wayne County, Mich., which has over sixty miles of concrete, replied that they wanted to keep the white color as it was particularly beneficial at night, for the road could be easily seen for long distances ahead of the driver. Thus from a theoretical, practical and economic viewpoint, concrete takes first place in the list of paving materials.

Laying Subaqueous Water Mains

Three different methods of laying flexible jointed water mains across streams were described at the annual meeting of the American Waterworks Association. At Rome, a line of 12-in. water pipe had to be laid across the Etowah River at two points, the river being 220 feet wide. An overhead cable was laid across the river, and on it were a pair of trolleys carrying tackle attached to a raft consisting of empty barrels surmounted by a deck. In one end of the raft was a central slot or well for laying the pipe, a tripod and hoisting tackle being mounted over this well. The first pipe was anchored to a tree on shore, with its outer end resting on the raft. The second pipe was coupled on and the raft pulled forward until only the end of this pipe was upon it, when the third pipe was coupled on. A supply boat carried the pipe lengths and other requisites, and was attached to the overhead cable in the same way as the raft. The pipes were put together with the Ward flexible ball joint. Soundings showed two rock ridges, and notches were cut in these by light charges of dynamite. For crossing Silver Creek, 60 ft. wide, a platform or bridge was built, and five 12-ft. lengths of pipe coupled up upon it. This continuous pipe was then lowered by tackle, keeping the ends above water for connecting to the shore pipes. A test showed heavy leakage, and examination by a diver proved this to be due to excessive angle of the flexible. The ends were disconnected, 60 ft. stretch raised, joints re-made, a bed of gravel laid, and the pipe again lowered. It was found that 12 deg. was the maximum angle that could be given to a joint without fear of leakage. At Meridian, an inverted syphon pipe had to cross a creek 30 ft. wide and subject to heavy floods. A submerged bridge was formed of a pair of heavy timbers 36 ft. long, stiffened by wing posts and truss rods, and upon this were laid saddles for the pipe, which were attached by long U-bolts. The structure was lowered in place, the pipes connected within cofferdams, and piles driven on either side of the "bridge."

Montreal's Progressive Building Programme

Preparations are being made in Montreal for the erection of several more ten-storey buildings, and next season promises to be quite as busy as the one that is closing. Contractors are just now rushing all exterior work, and the frames of several fine structures are practically completed. A big building with a frontage of 83 feet on St. Catherine street west, near Stanley street, is planned, and it is also proposed later to erect another skyscraper adjoining. Other up-town schemes include a ten-storey building at the corner of St. Catherine and Peel streets; a big building on the proposed site of the Mount Royal Hotel, now abandoned, Windsor street; a commodious Post office; and a ten-storey structure on the premises on St. Catherine street west occupied by the Leach Piano Company. A big departmental store is now being erected by the Peter Lyall Construction Company at the corner of Bleury street and St. Catherine street west. This will be the largest store in Montreal, and will be six storeys high. The exterior will be of terra cotta and granite, while the whole building will be fireproof.



A spandril-arch bridge for street car and general traffic is to be erected between the two bridges shown in this picture at St. John, N.B., over the famous reversing falls.

Longest Spandril-Arch Bridge in the World

WHAT is said to be the longest spandril-arch bridge in the world will be built between the two bridges shown in the accompanying illustration. One of the present bridges is the suspension traffic bridge which was built in 1852, and the other is the cantilever bridge by which the Canadian Pacific Railway enters the city of St. John. The old suspension bridge is about worn out, and the new one will provide for both team and street car traffic. Tenders for its erection closed on December 2nd. The cost of construction is estimated at about $300,000. There will be two sets of tracks for street cars, besides a driveway and a passage for pedestrians.

The bridge will show no steel work above the floor except the steel railings along the sides. The general style of the trusses will be in the form of a segment of a circle, starting low at each end of the bridge and curving upwards toward the middle. The span will be about 730 feet. As may be seen from the picture, there will be some difficulty in getting the foundations, and there is also a strong demand from the city that provision be made to overcome the level crossing at the farther end of the railway bridge. Conferences have been held this week, between the representatives of the provincial government, the city and the Canadian Pacific Railway, to consider the best method of overcoming this difficulty. The St. John Railway Company will contribute to the cost of the bridge, in order to have provision made for street car traffic, thus connecting its lines in East and West St. John. At present the lines terminate at either end of the suspension bridge, and passengers must walk across in order to make a transfer.

The old suspension bridge shown in the picture has a span of 640 feet, and cost $80,000 when it was built in 1852. The stone towers are 33 ft. high, and it is hung on 10 cables. The actual width of the river below is about 400 ft., and at low tide the bridge is 70 ft. above the surface.

The famous reversing falls of the St. John River are just above these bridges, and present one of the great engineering problems of the world. Over and over again engineers have studied the situation to learn if it would be possible to harness the enormous tidal energy of these falls, but no workable plan has yet been devised.

The reader must note the fact that the whole volume of the St. John River and its tributary lakes, the river being 450 miles long and having sources in Maine and Quebec as well as in New Brunswick, pours through the narrow gorge below these bridges. Just above the bridges a ledge of rock thrusts itself up, with the result that when the tide goes out of the harbor and the river below into the Bay of Fundy, the surface of the river above this ledge is very much higher than the surface below, and thus produces the effect of falls and rapids, the fall being toward the harbor. When the tide sweeps up the bay and harbor and into this narrow gorge, it forces back the waters of the river and causes a slight fall at high tide in the direction opposite to that at low tide. When it is half tide the surface is particularly smooth, and vessels are able to go up and down under the bridges without danger, schooners being compelled, however, to lower their top-masts. The problem which engineers have tried to solve is to utilize the enormous power developed by the incoming and outgoing tide and make provision for the short period of slack water.

The heavy grading incidental to the removal of the "Hump" in Pittsburgh brings the new grade far below the original street level in several blocks adjacent to Smithfield Street and First to Seventh Avenues. In one case a three-storey brick building about 30 feet wide had footings on the shale rock which was cut away to a depth of nearly twenty feet. In order to conform to the new condition provisions were made for maintaining the building at the original elevation and excavating below it and building in new storeys down to the revised street grade. In order to accomplish this the rock between the cellar walls underneath the house was carefully blasted with light charges of dynamite and excavated to sub-grade.

Afterwards recesses 5 or 6 feet wide and 2 feet deep were chambered out of the face of the rock in alternate sections under the old footing and masonry was built in them forming piers underpinning the original walls. Afterwards the intervening spaces were recessed and new walls built in them continuous with the piers first made, thus completing the supports and providing side walls for the new lower storeys.

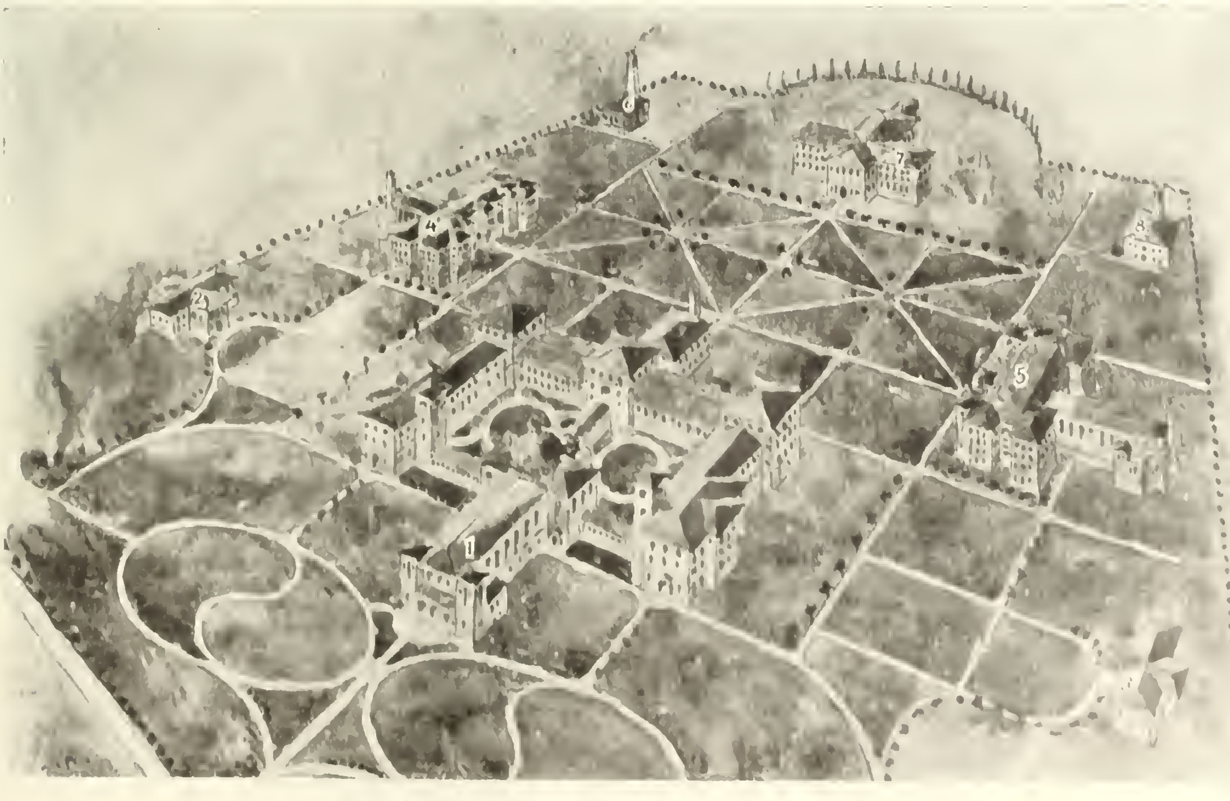
Proposed Grey Nuns' Orphanage, St. Lambert, Quebec

Preliminary plans have been prepared by Mr. Alphonse Piche, Montreal, for a big scheme of buildings at St. Laurent, P.Q., for the Grey Nuns. At present there is an orphanage in the west end of the city, but it is proposed to dispose of this in order to carry out the new project, which is estimated to cost ultimately about $5,000,000. The entire buildings, with the ornamental gardens, will cover an area of 1,500 x 1,500 ft., and the largest structure will contain a chapel and administration offices. This will be cruciform in shape, the chapel extending towards the road, while the administration offices will be constructed in a square, and will enclose an inner court. These offices will be the headquarters of all the mission work of the Order throughout Canada.

The other buildings comprise boys' and girls' schools, boys' and girls' orphanages, house for the aged poor, power house, and laundry. It is also proposed to conduct a farm, and stables and other accommodation is to be provided on the land, which adjoins the buildings, the total area being about five hundred acres.

A commencement has been made with the boys' school, the general contract for which is let to the Atlas Construction Company, Mr. J. Ballantyne doing the plumbing and heating. The general design is in the Spanish style of architecture. The plans show a concrete building on a steel frame, the general idea being to construct a strong, plain, and roomy school. The school rooms are on the main floor, the other storeys being devoted to dormitories and play rooms. The Sisters have sleeping accommodation on each dormitory floor. Fifty children will sleep in each dormitory, and provision is made for six hundred cu. ft. of air for every child. There is to be a kindergarten school on one of the floors. A swimming pool is one of the features. Very little wood is employed in the building, the floors being of concrete. The chapel extends towards the road, and will be very plainly furnished. The dining rooms are to be in the basement, and the kitchen will also be placed there, but completely detached. A boiler house is to be built, the heating being by steam. Electric lighting is to be installed.

Where a finish is applied to a structural concrete floor slab reinforced with steel throughout, and where every means is taken to bend the finish to the underslab, there is no excuse for the line joint which is so generally used. It does not prevent cracks; it is only used because it is conventional. The first trouble experienced with the concrete floor arises from the breaking down of the edges of these joints, and manifestly they should be omitted, says Leonard C. Wason. Basement pavements should be laid in as large blocks as possible. A 10 x 10 block of 4-inch pavement laid on a good bottom is reasonably free from danger of cracking. Structurally, it is probably better to lay the floor continuously without joints, and let cracks occur where they may.



Proposed Grey Nuns' Orphanage, St. Lambert, Que.
1. Administrative Offices and Chapel; 2. School for Boys; 3. School for Girls; 4. Boys Orphanage; 5. Girls Orphanage; 6. Power House; 7. House for Aged Poor; 8. Laundry

How to Cheapen Road Construction

An Economic Discussion of the Methods of Road and Street Work and Suggested Remedies for Faults Which Obtain at Present*

DURING the last decade or two there has been a wonderful impetus for better roads and streets. This has been further augmented by the prevalent use of the automobile in both city and country. In spite of this we still have miles of unimproved streets in our towns and cities, while in every section of the country there are hundreds of miles of roads that are little more than passable, during a great part of the year. The crying need everywhere is for money to improve the streets and roads.

In a short article the contractor's side cannot be presented in its entirety, but enough can be written to call attention to some phases of the question. In this article the more practical side will be discussed, that is how the cost of road and street work can be reduced.

Modified Contract and Specifications

The first improvement to be made is in letting contracts and in modifying some details of the contract and specifications. It is the intention of all public officials to obtain as much competition in the letting of public contracts as possible, yet in many cases the procedure as now followed throttles competition by excluding many contractors. The first thing to mention is in demanding certified checks to accompany proposals. If the amount of the contract is large and a check for five or ten per cent. of the total contract is demanded then the contractor is asked to put up a large certified check, equivalent to that much cash, which may be tied up for several weeks or a month or more if there is a delay in awarding the contract. This is sometimes a serious difficulty to contractors, who are carrying on a number of contracts on a limited capital. In place of a certified check a bidding bond can be furnished by all responsible contractors at a very small cost, or he can be given the choice of furnishing either a bond or a check. The fact that a check is furnished is no sign of responsibility for often the bright, quick witted, irresponsible man will find a way of obtaining a check, when the more staid, upright man will forego bidding rather than place himself under obligations to others. This is the same thing as furnishing a surety bond and having personal sureties.

Road and street work is advertised in two classes of publications, the local newspapers and the engineering papers. The first reach only the local contractors. The second reach the engineers of the country, who are not interested in the letting and award of these contracts and a few contractors of the country. Few of these papers claim more than seventeen or eighteen thousand subscribers, and as a large per cent. of these must be engineers, then it can readily be seen that as there are from thirty to forty thousand contractors in the United States, that only a comparative small number of contractors are reached by these advertisements. The method should be to continue this advertising and to include in with it the contractors' papers, as these are subscribed to almost exclusively by contractors and thus the new work will be called directly to their attention. In this way there would be much greater competition than now exists on public contracts.

Another thing that limits competition on contracts for road work is the length of the season. This affects the overhead charges and other items of expense. Thus the cost of renewals and maintenance for a steam roller and the interest charges that may, during a year, amount to say $300, must be charged over the short working season. For most construction work there are from two hundred and fifty to three hundred working days, but only in a few sections of the country can a road contractor count on much more than one hundred working days, especially when using bituminous binders. Thus, instead of the plant charge for a roller being but little more than a dollar per working day, it is about three dollars, a considerable item. This also applies to other items of plant charges and for general office expense and the forces that must be employed during the entire year in order to retain them.

These are most difficult items of expense to meet and reduce, yet they materially affect the prices bid on road work. There are times though that the engineer or road commissioner can lay out his work and let it in such sections as to include a variety of work so that the contractor can work at some part of his job even during the winter, or if this is not possible the season for work can be lengthened. Thus old macadam can be torn up and grading, foundations for bridges, pile driving, opening quarries and crushing stone can be done late in the fall or early in the spring when it is not possible to lay the metal surface. If contracts are let so as to allow of such work being done out of season, the contractor can bid lower prices. It is a great help to him, for it allows him to keep up a more efficient organization and do much cheaper and better work, and the public money is saved for more construction.

Purchase Materials Ahead

A very vital consideration in construction work of this kind is the buying of the necessary materials. It seems the natural way to pay for these is in the completed work, with the result that a contractor may have many thousands of dollars tied up for some months. Thus a contract that may be let in the fall for a considerable stretch of road construction, may not permit of much grading or road work being done, but a quarry could be opened, stone crushers installed and many tons of crushed stone gotten out and stored for use in the spring and following summer. This means a large expense account for labor, explosives, coal, oil and other items. Towards spring, cement, lumber and similar materials should be purchased in order to push the work properly when good weather opens up. This again means a large expenditure of money, as the contractor must pay for these materials within thirty or sixty days, while he may not be paid for all of them for six months or more. Then he must have wrapped up in the work a large amount of capital on which he must earn interest. This is seemingly not a great hardship, yet when one considers that a contractor, who was discounting his bills, once kept an account of how much a ten dollar bill earned in discount for him on his work in one year and found that it amounted to over five dollars, it is readily seen what an important part cash plays in contracting.

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* By Daniel J. Hauer, in The Contractor, Chicago.

But the worst feature, and one that means much to those interested in building improved roads and streets, is the fact that this limits the number of contracts one contractor can take, and it also means that many contractors are unable to undertake contracts that call for such heavy expenditures of money. In other words, only contractors having large capital can enter the road building field and do the work at a reasonable cost, and prepare for it ahead of time.

Assist Contractors with Limited Capital

Make it possible for the contractor with limited means and with a good reputation for integrity and business ability to bid on road contracts, especially the man who spends all of his time on his work, and public officials will see road construction done at a much less cost than ever before. This statement is based on long experience of the railroad companies in handling their construction work. They have not hedged their work around with certified checks and other features that cut out the small contractor, but have rather made it easy for him to handle their work so that prices for their construction have been reasonable for a long period of years. They have found a place for both classes of contractors, the one with large capital, who can handle a dozen or more jobs at a time, and the man or company with limited means who can take only a small job or two at one time.

This has been done by helping the contractor to pay for his materials as the bills for them fall due, thus making it an incentive to the contractor to always have plenty of materials on hand. In doing this bids are seldom received for materials furnished and then for placing them, for in this manner a contractor can take advantage of the owner, for he can unbalance his bid, naming an exhorbitant price for furnishing the material, thus overpaying himself at the start and naming a price of a few cents for placing the materials. Bids are taken for the material in place, but if the contractor shows a willingness to furnish materials ahead of time and thus push the work, then allowances are made in each payment to the contractor or for such materials that have been purchased and stored; for instance, on cement almost ninety per cent. of the cost is allowed monthly, on pipe and timber, fifty per cent. of the price in place. For crushed stone enough to cover the cost of producing it. In this manner there is no profit allowed the contractor until he places the material, but ample allowance is made to meet his bills for materials, while he is paid his regular prices for completed work. These allowances are listed in two ways in a contractor's estimates, either as materials furnished without deducting any retained percentage, and then each month as the materials are placed they are deducted from the estimates of materials furnished, and estimated in the completed work, or else an allowance of completed work is made for the materials. The last method is not to be recommended, especially for a public works engineer as it might look like deception.

Fault cannot be found with the first method as the records show for themselves, and no one is injured by paying out the money for the materials any more than for completed work done each month. If the contractor defaults in any manner, the materials having been paid for can be seized and held in the storage yard just as well as those in the completed work. With this assistance given the contractor, no matter what amount of capital he may have, he can do more work with less money, and thus his work is cheaper, as one of the most glaring defects of many lines of business is that overhead charges in many cases eat up the profits and sometimes the capital. That is true of road building and it is incumbent upon the engineer to improve these conditions whenever possible.

All of these things are those that the engineer and public works official can rectify themselves. Others could be mentioned, but enough has been written to start the thinking man on the right track.

There are other features that must be worked out jointly by the contractor and the engineer. Among these are improved methods and better machinery for doing the work. The engineer and public works official are interested in this part of the subject, entirely from the viewpoint of obtaining lower prices for their work; the contractor in order to make profit, which being increased, means lower prices on subsequent work. Thus the incentive of each means a saving to the taxpayer, more roads for the same money.

Improved Machinery Needed

With machinery there should in many cases be decided improvements, not that there have not been improvements during the past decade, but these can be attributed to the manufacturer rather than to the engineer or contractor. Many tools and machines originally designed for some other work have been adapted to work on roads, with the result that although good service has been given, yet it could be materially improved. For instance, all machines meant for stone spreading were originally designed for grading work, and although the cost of spreading stone has been materially reduced by them, yet this work should be done quicker and for even less money. The spreading dump wagon should be the solution of this problem and it is to be regretted that it is not in more general use, for then it would be improved and made more efficient.

The handling of bituminous materials in pots and buckets is a mere makeshift and expensive one, due to two reasons, first because a large number of men are needed to do the work and secondly when these binders are put on by hand they are bound to be uneven, causing indifferent wear and in many cases a waste of material. This work should be done by machinery, carts and sprinklers gauged to throw out a given amount of binder to the square yard. Such carts must have an economical heating apparatus.

The concrete mixer manufacturers have responded quickly to the need of a hot mixer for road work and these will no doubt be much improved during the next few years.

Improved machines of all types are needed to cheapen road construction, but there must be a limit to the amount of machinery the contractor can own to do economical work. This can be arranged by obtaining from one machine services for several different classes of work. That is being done in mixers, the same machine mixing concrete and then bituminous macadam.

One manufacturer has a roller that can be changed into a traction engine, also used to operate crushers and other machines. An attachment can be added to scarify and break up old macadam, and an elevating grader behind the scarifier so that grading can be done at the same time. Thus a great variety of work can be done by the same machine and the cost of plant materially reduced.

However, it must be borne in mind that there is a point at which it is false economy to reduce the plant item, for instance, a hauling outfit made up of tractors and large spreading cars, or automobile trucks, may cost more than the necessary horses and wagons to take their places, but the work done is so much more efficient and the operating costs so much less that the saving in a season will often more than pay for the extra cost of the plant.

Value of Scientific Management

There is a great opportunity for the introduction of scientific management in the construction field. The waste of material and labor is flagrant. Scientific methods of handling these details means the elimination of these wastes. There are many who doubt if these methods can be used for construction, but the writer knows from an extended experience that they can. In some cases these wastes are seen and recognized as such, but in most cases bound by training along certain methods, the ordinary man in charge of work either cannot or will not see these things.

Results can easily be obtained by economists when the same acts are continually repeated by a large number of people, and those doing the same work can be grouped together, as this might be termed the "A, B, C" of efficiency engineering, but the great results are obtained in many lines of business when the conditions are exactly the opposite of this. In other words, efficiency engineering is a broad subject. It includes the culling out of obsolete business ideas, the substitution of contract work for day labor, the paying of bonuses, the elimination of both waste of materials and labor, the selection of plant and machines, arrangement of plant and men, the operation of machines, the handling of tolls, and a hundred other details.

Tho work of the past and the results obtained have been mostly in the mechanical branch of engineering or commercial manufacturing. But some of the great reforms and results obtained have been in teaching men to use judgment by paying them extra when they gave thought and study to their work, thereby increasing the amount of work done and the quality of it.

The work of the future will be in the field and under conditions that are seemingly against the efficiency engineer. This includes the engineering contracting field in the work of building engineering structures, where the same man does not perform the same work twice, the operations are conducted at widely scattered places, the workmen are incompetent, the plant inadequate, the designing department poor, and possibly the bank account exhausted. Without a business and with a depleted bank account, an economist cannot create a business nor can he perform wonders or miracles. But with the other conditions he can work, and if he himself is competent obtain astonishing results.

There is danger that each engineer or contractor is liable to think that the very waste occuring on another man's job does not occur on his, and in many cases he also believes that he knows more about his work and how to conduct it than any one who might be employed by him. It is in these things he errs.

As soon as a man feels this way he can rest assured that he needs the services of an efficiency engineer. We are but at the threshold of efficiency engineering and no man can tell what its limitations will be. Men have dreamed strange dreams that have come true and revolutionized the business of the world. Morse was considered a dreamer and his telegraph instrument a mere toy, but it revolutionized the world and increased the efficiency of the world's business.

Preventing Dust on Macadam Streets

Methods of preventing dust on macadam roads were described in a paper before the Engineering Society of Wisconsin by Mr. John F. Icke, city engineer of Madison, who told of his experience with tar and asphaltic binders. A summary of the paper is given below.

Surface Treatment with Tar

Mr. Icke's experience with the use of tar in the surface treatment of macadam streets dates back to the year 1908, when the first trial was made. The material used was Tarvia A, made by the Barrett Manufacturing Company. The street in question was one built of crushed limestone in 1897. The surface was in ideal condition with very few depressions or irregularities.

The preliminary treatment of the road surface before applying the tar consisted in thoroughly sweeping the street to remove as much of the dust as possible. The consistency of the tar was such that it was necessary to heat it before it could be applied. Application was by means of sprinkling cans with broadener nozzles. Approximately ½ gal. of tar was applied per square yard of surface. The surface of the tar was covered with a thin layer of coarse limestone screenings, approximately ¼ in. in diameter, from which practically all the dust had been removed. The street was rolled with a 15-ton roller and was thrown open to traffic as soon as possible thereafter. After the excess of screenings had been worn away the street resembled in many respects a sheet asphalt pavement.

When 2 years had elapsed a second treatment was given, similar in all respects to the first except that the quantity of tar per square yard was about 1/3 gal. This second treatment was applied primarily to cover the individual stones which projected above the general surface of the pavement, and were thus not thoroughly covered by the first treatment. Several excavations made in the street since the last treatment show that the tar penetrated the surface of the road from ¾ to 1 in. and thoroughly bound the surface.

The treatment, Mr. Icke reports, has practically eliminated dust caused by the breaking down of the stone under traffic. The street is, however, not dustless as more or less dust is brought upon it from traffic and other outside sources, and it has been found advisable to give the street more or less sprinkling with water to keep down the small amount of dust which does accumulate from the sources mentioned above. The surface is said to be so well bound that any ordinary rain will free the surface from dust as though it were an asphalt pavement.

The cost of the first treatment was 7 cents per square yard. In this cost is included cost of cleaning the street, the cost of the tar, of heating and applying it, the cost of the screenings and applying them, and the cost of rolling. The second treatment cost 4 cents per square yard as the quantity of tar applied per square yard was less.

Applying Light Tar, Cold

In addition to applying the heavy tar mentioned above, a lighter tar requiring no heating before applying has been used with considerable success, according to Mr. Icke. This tar is sufficiently fluid under ordinary temperatures to run freely from the tank-cars in which it is shipped.

Before applying the tar the road surface must be cleaned of all dirt so as to expose the stone surface. If any cakes of dirt or screenings are allowed to remain on the surface the tar will not penetrate into the macadam, but will be absorbed by the layer of dirt or screenings.

The tar is hauled from the tank-cars to the street in wagons equipped with a sprinkling attachment attached to the rear. Suitable regulating valves are provided which make it possible to gauge the quantity of tar to be applied. About 1/3 gal. of tar is applied per square yard of street surface.

The tar, especially during warm weather, penetrates into the surface of the macadam sufficiently at the end of 6 to 12 hours to enable the street to be thrown open to traffic. The efficiency of the tar as a dust preventative, Mr. Icke points out, lies in the fact that it penetrates the surface of the street from ¼ to ½ in. and firmly binds or holds the stone in place.

The cost of the cold-tar application described above is about 1.9 cents per square yard. In order to get the best results a second application of tar should follow the next season after the first application. These two applications, it is stated, will then be sufficient for the two or three following seasons.

Asphaltic Oil Surface Treatment

The preparatory treatment is similar to that for the application of tar. The ideal surface is a macadam free from dust and dirt or layers of screenings. If repair work is not done a sufficient length of time in advance the oiling will not be as satisfactory as it would be otherwise, for more or less of the material added will work loose under traffic and will mix with the oil, making a pasty mass instead of a rubber like blanket, which is the result when the oil is applied to a surface which is in proper condition.

The heavy asphaltic oil is shipped in tank cars equipped with steam coils. The oil in the tank is heated by making a steam connection with a traction engine or any other boiler which is able to furnish the steam. The oil should be heated to about 150 deg. Fahr. to enable it to run freely from the tank cars into the wagons equipped with the sprinkling attachments before mentioned.

The oil is applied by driving first down the center of the street to be oiled and then on either side of the center a sufficient number of times to cover the whole width of the street. The amount of oil applied is under the control of a man who rides at the rear of the wagon. After applying the oil the street is closed to traffic to allow the oil to penetrate the macadam. The best results are obtained if the street can be closed to traffic for about one week, at the end of which time all the lighter oils will have penetrated the macadam and then traffic will not pick up the oil.

Mr. Icke believes that the best results are obtained by thoroughly cleaning the macadam surface; applying a heavy asphalt oil containing not less than 60 per cent. of asphalt; by applying the oil hot and during hot weather; by keeping the traffic off the street for at least six or seven days and thereby eliminating the use of either sand or stone screenings upon the finished surface.

If the work is done as outlined above the result is a rubber-like blanket which protects the stone from traffic, thereby preventing in great measure the formation of dust. The blanket of oil also absorbs apparently a great deal of dust which is carried onto the street surface.

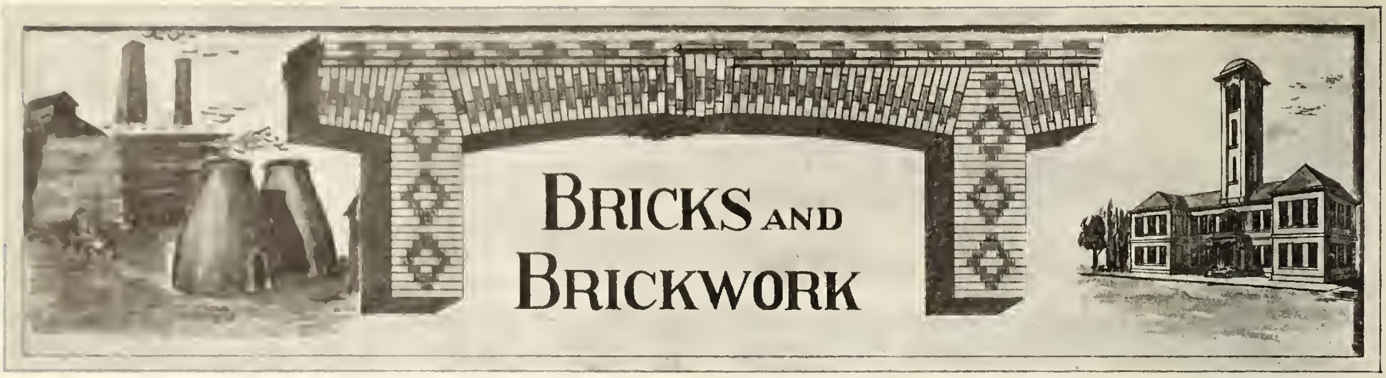
Cost of Oiling

The total cost of oiling 288 miles of street in the city of Madison during the season of 1911 was $11,744; of this amount, $7,964 was for the cost of the soil. The remaining sum of $3,780 was for all the other items which were chargeable to the work. These items were labor of engineers employed to keep up steam in the traction engine which was used to heat the oil; the cost of the coal used; cost of applying the oil; cost of preparing the surface of the macadam, and the cost of the sand or screenings used and of applying them. The cost per square yard, on an estimated yardage of 42,000 was 2.8 cents. The cost per mile for streets of various widths was $410. The asphalt oil costs 3.3 cents per gallon f.o.b. Madison.

An oil suitable for the purpose should fulfil the following requirements, according to Mr. Icke: Specific gravity not less than 0.92 at 77 deg. Fahr.; fixed carbon not more than 8 per cent.; flash point not below 275 deg. Fahr.; loss at 212 deg. Fahr. zero; mineral matter or ash, none; soluble in cold carbon bisulphide not less than 99 per cent.; loss when heated 5 hours at 325 deg. Fahr., not more than 5 per cent.; residue must flow at 77 deg. Fahr.; residue left from heating oil for 5 hours at 400 deg. Fahr. must flow at 77 deg. Fahr.; after heating oil at 500 deg. Fahr. to a penetration of 100 at 77 deg. Fahr. there must be left at least 25 per cent. of material which shall have a ductility of more than 10 cm. at 77 deg. Fahr.

Besides the surface treatments mentioned above a method of binding the upper 2 or 3 in. of the surface of the macadam with an asphalt or tar has been successfully used to lessen the formation of dust. The surface of the street is finished in the usual manner, but the addition of the screenings which are ordinarily used to bind the surface is omitted and the interstices are filled with either a suitable tar or an asphalt binder. The bituminous material so added holds the stone in place, and in the case of the asphalt binder a surface resembling a sheet asphalt results in a short time after the street is thrown open to traffic according to Mr. Icke.

The addition of a coat of oil on top of an asphalt filled macadam results in an almost ideal pavement, states Mr. Icke, as the street is not slippery, is perfectly noiseless and almost dustless.



Details of Modern Brick Design—1

An article in two parts, specially contributed by S. H. Penlington, A. R. I. B. A.

IN a consideration of the above subject the first observations will be devoted to panels and friezes, this being the most common phase of the subject. In the next issue of this journal, wall treatments, gables, windows, doors, etc., will be discussed.

In connection with panels and friezes the variations that can be obtained are endless, but the most interesting examples only will be dealt with. It might almost be said that there had developed a new style of architecture, composed mainly of brickwork, with stone used only to emphasize important parts of the buildings. This appears to have been brought about by a variety of causes. Firstly, the greater use of wood has inclined people to something different and more substantial; secondly, the high price of stone has driven them to the use of brick, and thirdly, the comparative costliness of brick has taught them to study its use and adaptation when they get it. Certainly the results obtained have been well worth the thought and labor expended by the designers.

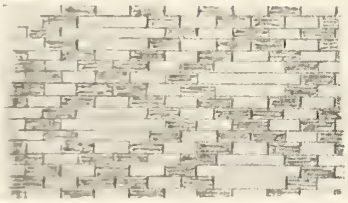


Fig. 1

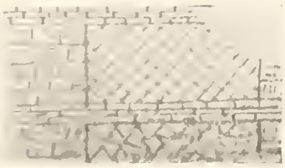


Fig. 2

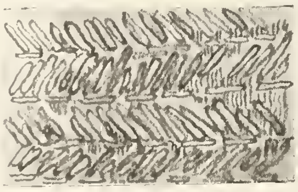


Fig. 3

Brick design in patterns was practised in mediaeval times, but in a different manner. The correct bond was maintained and a different shade of brick was used to get the desired effect, as shown in Fig. 1, the illustration being taken from the Doges Palace, Venice. The ideas shown in the present style may very well have been obtained from the Roman walling or Norman herringbone work, shown in sketches 2 and 3. In the following examples the bond is broken only in the panels between supporting piers or in cornices or small buildings where the loads do not affect the safety of the buildings. It is therefore good and artistic practice to use brickwork in this way.

The second group of sketches, Figs. 4-7, are friezes. No. 4 is an adaptation from a small panel, while No. 5 is executed in tapestry brick and looks quite well at a height of five storeys. Figs. 6, 7 and 8 are from the Church of St. Patrick, Brockton, Mass.—a beautiful brick structure in the Romanesque style, by Chas. R. Greco, to whom the writer is indebted

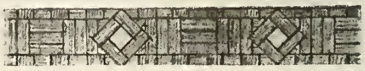


Fig. 4

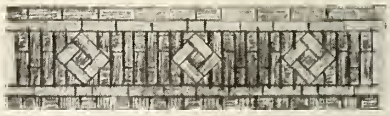


Fig. 5

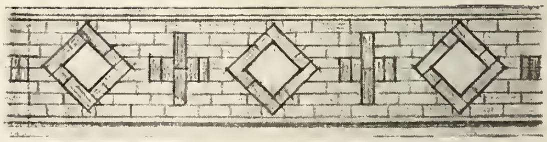


Fig. 6

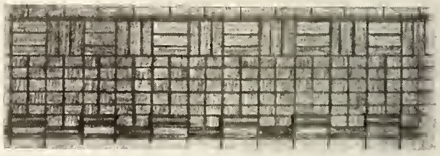


Fig. 7.

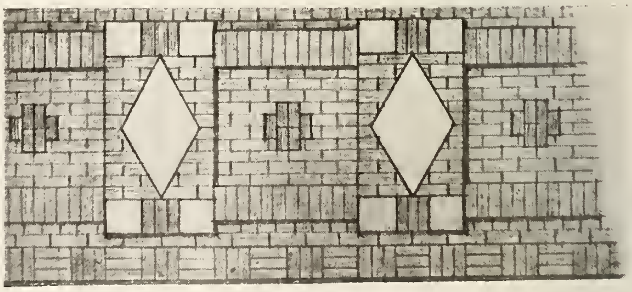


Fig. 8

for some of the panels which follow. The frieze shown in Fig. 6 is placed between a stone architrave and cornice and is most effective in that position, while Fig. 7 is under eaves, about forty feet off the ground. Fig. 8 is the apsidal end of the church, about sixty feet high. The perspective effect obtained is very fine. The judicious use of stone in all this work is most effective in creating the high lights and in attracting the eye.

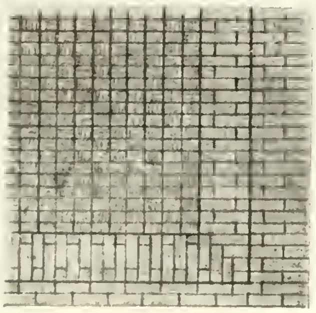


Fig. 9

The panels shown in Figs. 9 and 10 are also from St. Patrick's Church. A surround to a stone doorway is shown in Fig. 9. Fig. 10 is a centre piece in a plain field between piers, while Fig. 11 shows a rich border surrounding a cross from St. Rose's School, Chelsea, Mass. The latter gives interest to what would otherwise be the blank end wall of a school. In Figs. 12 and 13 there are shown simple panels under windows, these being quite common examples. Fig. 14 is a large panel with stucco in the border instead of stone. This panel is two storeys high and forms the frame for the windows of a small bank—making a very interesting architectural corner. It will be noticed that the same idea runs through all these details. The bricks are laid in the most interesting manner, generally with a white mortar joint. High lights are obtained by the use of stone, stucco or vari-colored bricks—the result being a great improvement on blank brick walls and a marked advance in the architectural use of brickwork.

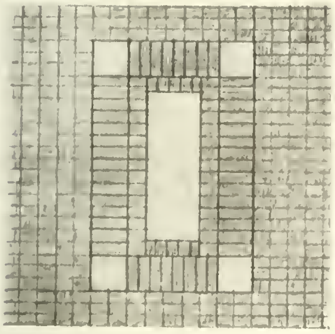


Fig. 10

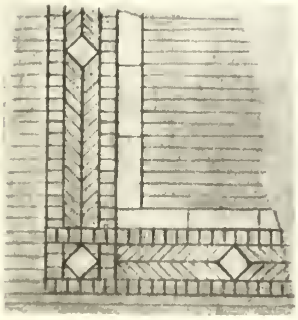


Fig. 11

(To be concluded in next issue.)

In order to widen the train shed of one of the railroad stations in Antwerp, Belgium, it was found necessary to move a brick wall, about 236 feet in length, a distance of 80 feet, says "Popular Mechanics." The plan first decided upon consisted of demolishing the wall and rebuilding it of the same material at the new location, but when the contractor undertook to do this, he found that the masonry construction was so solid that tearing it down would so damage the old material that it could not be used again. Therefore, he had the wall cut off in one solid piece, and moved on rails to its new location. The complete operation was accomplished by 18 men in 14 days, the actual moving taking but 27 minutes. The plans were so well carried out that not even one crack appeared.

Constructing Tile Floors

In recent years the old-fashioned tile pavement has come into great favor, particularly the large, dark red squares known as Welch tiles. To support such a flooring on a house built of masonry is no great problem, for the necessary bed of concrete rests securely on a masonry arch as some form of terra-cotta construction. But where a tiled conservatory or porch or dining-room is desired in a frame house, how to support the concrete bed on which the tiles are laid is a matter of considerable care, says a writer in "House Beautiful." It is best done by having rough boards cut in between the floor beams and resting on ⅞-in. strips nailed to the sides of the beams. The tops of these boards must be at least 4 in. below the finished floor line, and better still 5 in., to allow of a concrete bed of sufficient thickness. A thin one would surely crack. The tops of the beams should be beveled off to an edge in the centre. This is necessary for two reasons; it allows whatever moisture may gather in the concrete both while it is green and during subsequent scrubbing operations, to run off; and also it is much better structurally, as it lessens the shallowness of the concrete over each beam.

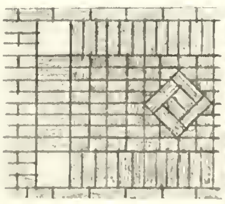


Fig. 12

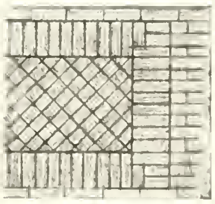


Fig. 13

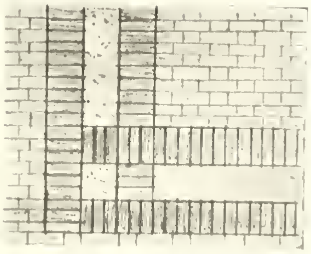
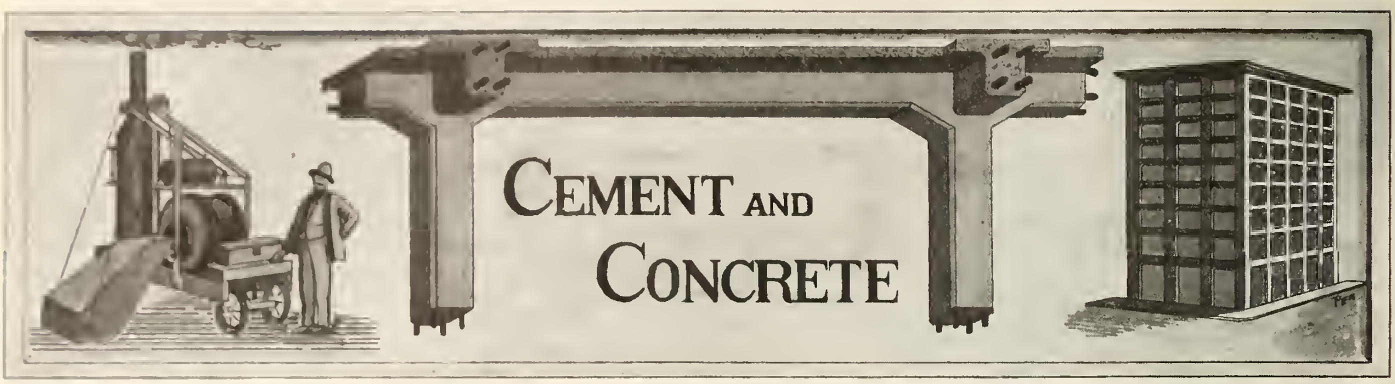


Fig. 14

Where a tile floor is put into an old building during alterations further care must be taken to cover the rough boarding and the beams with weatherproof paper to keep the moisture from discoloring the ceiling below. No heed should be given to builders who advise soaking the beams with creosote as a protection, for the creosote will eventually find its way to the plaster beneath, whence its stain will be impossible to remove. Where the tiles are for an exterior porch under which there is no excavating, it is best to build a brick retaining wall as foundation for the porch, fill the enclosure with sand, bring it to a level and spread on it an 8-in. bed of concrete for the tiling. This all sounds troublesome, but one is well repaid by the stability and permanence of a properly laid tile floor. As to its beauty, that depends on the selecting of the tiles. Decorated ones are risky and except for the famous examples such as the Persians or the Moors once made, there is greater beauty in good plain colors that contrast, not harmonize, with the walls.



Reinforced Concrete Construction—2

By Professor E. Brown,
Department of Civil Engineering, McGill University, Montreal

The second of a special series,[*] written exclusively for the Contract Record and Engineering Review

Shearing in Beams.—Beams and similar structures have to be designed so as to be capable of resisting both the shearing force and the bending moment due to the loads carried. The resistance to bending has been considered already, and the method of computation follows very closely that used in the general beam theory. Experiment justifies the simple treatment explained. The way in which a reinforced beam resists shearing is not understood so completely, and while there is much experimental data available regarding the various considerations involved, such as the resistance of concrete alone to shear, the bond resistance of rods embedded in concrete, and the general behaviour of loaded beams when reinforced in various ways to resist shear, our knowledge of the action in an actual beam is general rather than precise. Consequently, it has become the practice to design beams to resist shear by the use of formulæ more or less empirical, having a somewhat inadequate theoretical basis, and depending on the general results of tests and practical experience. The application of these will be considered later in a typical case, but the function of the shearing reinforcement must be explained in order that the grouping of the steel in a typical beam may be understood.

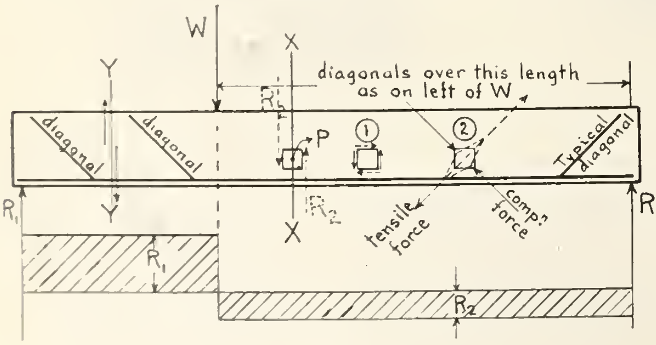


Fig. 8

When a beam (Fig. 8) carries a load W at any section, reactions R_1 and R_2 are set up at the supports, and W, R_1 and R_2 constitute a system of forces in equilibrium. If any section of the beam between W and R_2 be considered, say XX, the total force to the right of $XX = R_2$ **upwards**, while the total force to the left of $XX = W - R_1 = R_2$ **downwards**. These are shown by the dotted arrows, and constitute **the shearing force or shear at XX**. Similarly the shear at $YY = R_1$. It will be seen that for sections such as XX to the **right** of W, the portion of the beam to the right of the section tends to move upwards relatively to the portion to the left, while for sections to the **left** of W the reverse is true. All sections to the right of W are subject to a shear R_2, and all to the left to a shear R_1. This is shown in the shearing force diagram. Steel rods placed near the base of the beam will provide resistance to bending as explained in a previous article. The presence of the shearing force calls for further reinforcement, since the shear gives rise to tensile forces in the body of the beam which the concrete cannot be depended upon to resist. The force R_2 is distributed in some way across the section and some part of it may be regarded as acting on the face of a small rectangular element surrounding P, any point in the cross section XX. For convenience this is shown separately to the right and marked 1, since the conditions are the same at all sections. The vertical forces shown would produce counter clockwise rotation of the element, and to counteract this there must be forces producing clockwise rotation. These are shown by dotted lines along the horizontal faces of the element. It is a well known principle in strength of materials that the intensity of these horizontal forces is the same as that of the vertical forces. The effect of such forces is obviously to distort the small element as shown in the additional figure marked 2. The forces are equivalent to tensile forces along one diagonal of the element, and compressive forces along the other diagonal. The former evidently tends to crack the concrete in a direction more or less at right angles to the line of pull, and as concrete offers only a small resistance to tension, a steel bar placed diagonally through the beam will enable it to resist better the forces to which it is subjected. This bar must slope upwards from the bending reinforcement towards the supports. Similar reasoning would show the necessity of placing diagonal bars as shown to the left of W, these bars again sloping upwards from the bending reinforcement towards the support. The above reasoning explains the necessity for providing shear reinforcement no matter what type may be adopted.

Methods of Shear Reinforcement Used in Practice

(1) **Kahn Bars.**—A very direct application of the above principles is afforded by the well-known Kahn bar, in which a series of diagonal bars or wings attached to the bending reinforcement fulfil the functions explained above. The bar is rolled with a cross section somewhat as shown above in Fig. 9. There are modifications but the principle is the same in all. These bars are then cut or sheared to fulfil the requirements of any particular case. If a cut be made transversely through the projecting wings of the bar, and be then continued along the inner edge of the wing, a strip SS is

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[*] The first was published in our issue of Nov. 20 last.

produced which may be bent up as shown, thus providing the diagonal reinforcement. The length of the strip can be adjusted to suit beams of different depths, and shearing can be arranged so as to give wings staggered on opposite sides of the bar. When the loading conditions are such that over certain lengths of beam there is no shear, the wings are not cut as above, and the full cross section of the bar is then utilized to resist the bending moment which will be a maximum over these lengths. The appearance of a Kahn bar when sheared for a load W, as in Fig. 9, would be somewhat as shown in the lower part of the figure. The shear for two equal loads symmetrically placed is also shown, the diagonals not being required for that part of the beam between the loads since there is no shear over that length.

(2) **Plain Bars.**—Suppose a beam with free ends to carry a uniformly distributed load producing bending moments and shearing forces as shown in Fig. 10. A certain number of bars, say five, will be required at the centre to resist the greatest bending moment. As the ends of the beam are approached from the centre, the bending moment decreases and the shearing force increases. If the maximum bending moment be divided into five equal portions, each rod may be considered to carry one of these. Hence, when the bending moment has diminished to four-fifths of its maximum value, as at the section X, only four rods need be retained to resist bending, and one may be bent up diagonally to resist shear. Similarly, at Y only two rods of the above remaining four are necessary to resist bending, and the other two may be bent up to resist shear. The arrangement is shown in the figure. This is a rational method of disposing of the rods and would give satisfactory results in practice. It is more usual to provide diagonal bars when the total shearing force exceeds a value which can be considered safe for the concrete to bear alone, say at Z, and this procedure is specified in the American standard specifications. In any case, the theory regarding the way in which the shear is carried is incomplete, and any rules are necessarily more or less empirical.

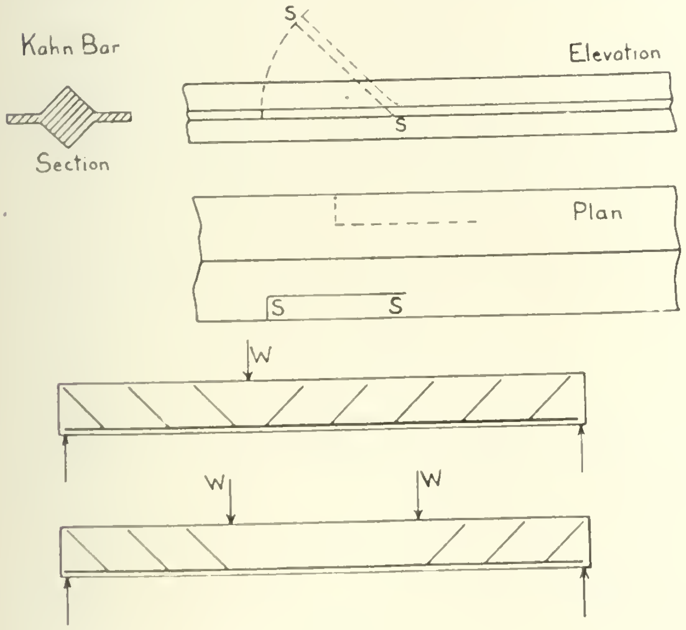


Fig. 9

This method of reinforcement can be used with any form of straight rods, whether plain, twisted or corrugated in any manner. Its use was developed initially on this continent rather than in Europe, where the Hennebique system of vertical stirrups noted below represents more usual practice. Present practice here is to use this method in combination with the vertical stirrups. The combination affords a very satisfactory method of resisting shearing stresses, and is well adapted to practical conditions.

(3) **Vertical Stirrups.** (Hennebique method). It has been explained above that when a beam, as in Fig. 8, is subjected to shear, there is a tendency for cracks to develop along such lines as **ab**. This may be observed frequently during the testing of beams, and a closed curve as shown may be drawn to include the whole of the crack during early stages of the loading. The crack may develop subsequently along the lines **abc**, as shown separately in the figure, and if it reaches the bending reinforcement, the two portions of the base of the beam into which the crack now divides it will be displaced relatively as shown by the dotted lines. A vertical stirrup placed as shown would obviously help in preventing the starting and subsequent development of such cracks, and the Hennebique system of shear reinforcement consists in the placing of a series of such stirrups at intervals along the beam. They may be bent at the top to give a good anchorage. The spacing of the stirrups will be closer, the greater the shearing force, just in the same way as web stiffeners on a plate girder are more closely spaced towards the ends of the girder than near the centre.

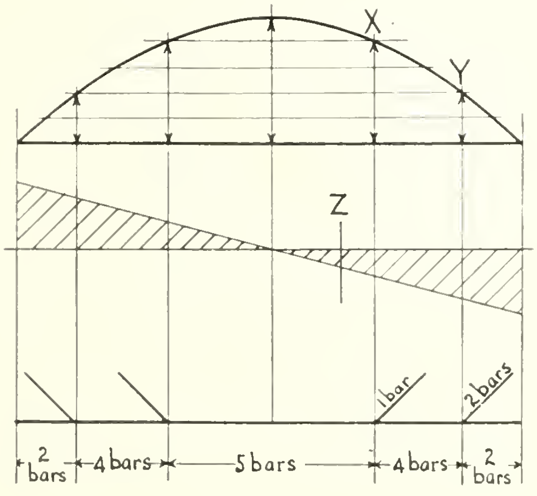


Fig. 10

Reinforcement of Main Beams of a Floor System

The methods of reinforcement used in practice and the functions of the various rods may now be understood. The necessity for providing steel to resist bending moment at the columns has been explained (see Figs. 6 and 7) in a previous article. In Fig. 12 a main beam and portions of adjacent spans are represented. Suppose that five straight rods have been found necessary at the centre to resist bending moment due to a uniformly distributed load. As the ends are approached the bending moment diminishes and then becomes reversed in sign, while the shearing force increases continuously. Hence, some of the bending reinforcement soon becomes unnecessary on the lower face of the beam and the centre rod of the five may then be bent up diagonally to help to resist the increasing shear. See Fig. [illegible] The

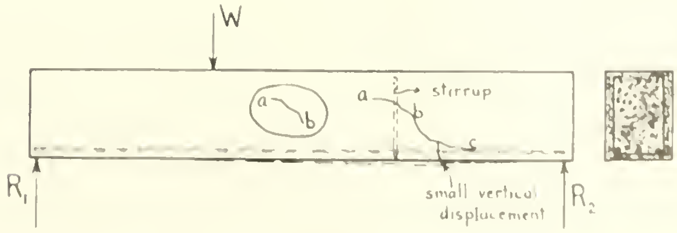


Fig. 11

and would then run along the upper face of the beam, through the columns, and would be bent downwards in the adjacent beams in a position corresponding to that in the beam between the columns shown. In the same way two of the four remaining rods, the outer two, may be bent up subsequently to add to the shearing resistance, being bent down again after passing through the columns. The other two rods run horizontally throughout the beams. This much may be accomplished by the use of straight rods only. Vertical stirrups are used in combination with this arrangement, being set so as to pass below the horizontal rods, and their upper ends are bent over so as to engage on the outer rods which have been bent up. This is shown in figures 12 and 13 and it provides a convenient method in practice for holding the component parts of the reinforcement in their proper relative positions. In order to provide sufficient steel on the upper side of the beam at the supports, other rods than those bent up as described may have to be provided. These are easily placed in line with the above rods.

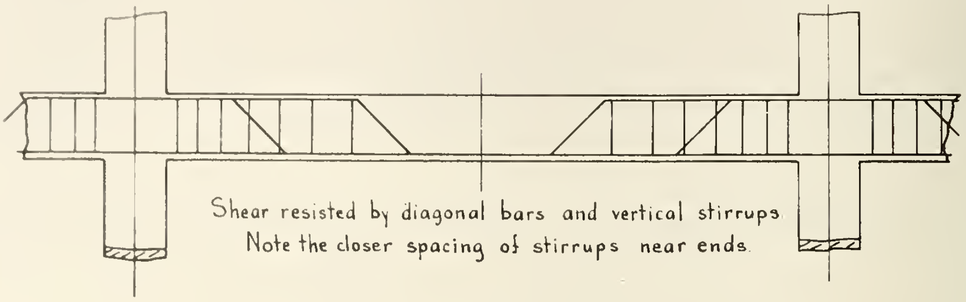

Shear resisted by diagonal bars and vertical stirrups
Note the closer spacing of stirrups near ends

Fig 12

Kahn Method

In this system the bars used for reinforcement at the centre of the span may be cut to various lengths so as to reduce the steel area as the bending moment diminishes, and if the shearing forces are very heavy some of them may be bent up diagonally to assist in resisting it. The reinforcement over the supports is provided by placing bars with the sheared wings projecting downwards, these wings alternating with those of the main bars which run horizontally right through the beams and columns. This arrangement obviously provides a considerable amount of diagonal material to resist the large shear at the ends of the beam. See Fig. 14 A distinctive feature of this method is that the diagonal strips are rigidly attached to the main body of the bar which constitutes the tension reinforcement. The wings or diagonal strips are sheared in the factory to a length suited to the requirements of the particular piece of construction to be carried out, and they are then bent to the necessary position when the steel reinforcement is to be placed in the forms. The wings must be of sufficient length to enable them to project well up into the portion of the concrete which is in compression. This is to ensure a good embedment, and to enable the steel to take up the tensile stress due to the shearing forces acting on the beam. The bar may be readily adapted to meet the bending moments and shearing forces arising from any given conditions of loading. Thus in Fig. 14 representing a floor beam carrying a uniformly distributed load, the full cross section of the bars may be utilized in tension over a length of beam in the vicinity of the centre where the shearing force is small; while near the ends of the beam the introduction of an inverted bar on the upper face of the beam provides the tensile force necessary to resist the reversed bending moment, and at the same time the sheared diagonal strips of both lower and upper bars provide amply against the shearing forces which are greatest at the ends of the beam.

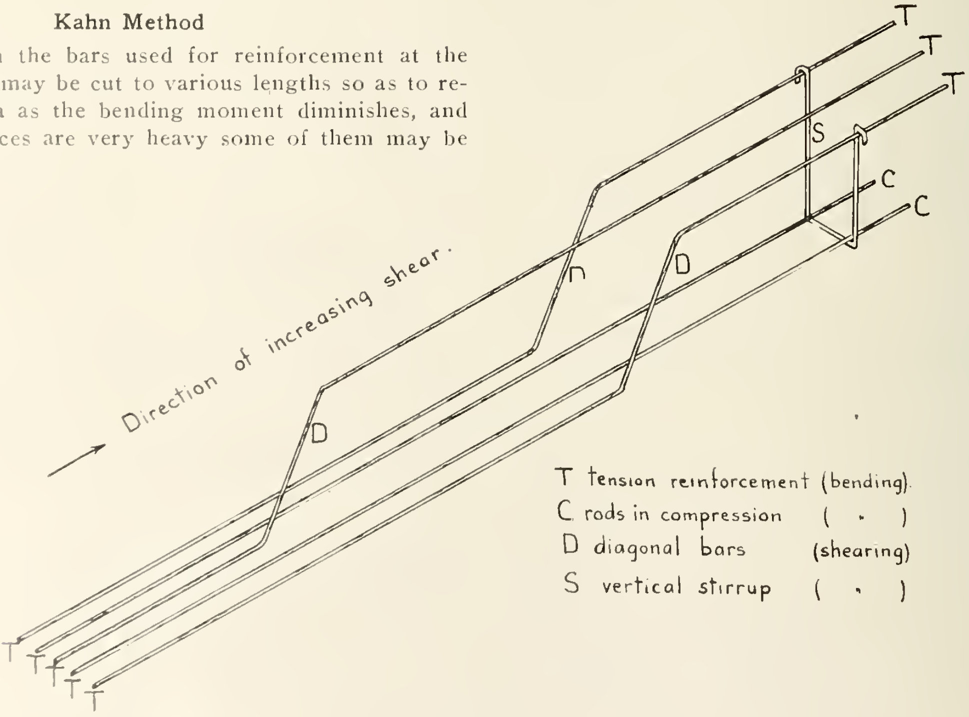

T
T
T
S
C
C
D
D
Direction of increasing shear.
T tension reinforcement (bending).
C rods in compression (")
D diagonal bars (shearing)
S vertical stirrup (")
T
T
T
T
T

Fig. 13

General Remarks on Shearing

The effect of the shearing forces due to the loads on a beam in producing tensile stresses in the body of the concrete has been shown in connection with Fig. 8. and the conclusion drawn was, that diagonal bars placed at an angle of 45 deg. with the length of the beam and sloping upwards towards the supports, would reinforce the beam against the effects of such tensile stresses which tend to crack the concrete. Any form of shearing reinforcement must aim primarily at the minimizing of this tendency to cracking, and at the prevention of serious development of such cracks should they occur. The Hennebique system of vertical stirrups has been shown to effect this object. It must be pointed out, however, that while the general effects described above, and the means adopted to meet them, are capable of simple explanation, the exact **quantitative** way in which such methods of reinforcement enter into the action in the beam is not directly calculable to any great degree of accuracy. In the first place, the shearing force is only one of the effects of external loading, and there are also bending moments to be provided against. The result is that in an actual beam the actual tensile stress at any point in the beam cross section is not that due to the shearing only, and its direction and magnitude will vary from point to point at any given section, and from section to section, and will differ from that due to the shearing alone.

Again, such calculations as are made to determine the shearing stress in beams, are based on the assumption that the tensile reinforcement resists the whole of the bending moment. While it is necessary to put sufficient tensile reinforcement into a beam to carry the whole of the bending moment (i.e., to assume that the concrete below the neutral line carries no tension, or is virtually cracked) it does not follow that beams are cracked in practice sufficiently to result in the whole of the tension being thrown into the steel. The concrete can and does, as a rule, carry a certain amount of tension, and hence resists a certain portion of the total bending moment; and experiment shows that under working loads this may be a considerable proportion of the bending moment. It is an indeterminate proportion, but the writer has tested many beams in which it was as high as thirty per cent. He would be the last person to contend that laboratory tests accurately represent practical conditions, but they throw a considerable amount of light on the probable degree of accuracy of many assumptions made in the design of beams; and it is beyond question that the tensile reinforcement in beams in actual structures may be more lightly stressed than the figures assumed in design would indicate, owing to the very appreciable tensile resistance of the concrete itself. This being so, the shearing stresses in the beam must also differ appreciably from those calculated on the assumption that the tensile reinforcement carries the whole of the bending moment, and in the writer's opinion the theoretical basis of computation of shearing stresses is open to considerable criticism. This view has been confirmed by experiments on beams reinforced against shear in different ways. It must not be forgotten, however, that even if a more rational method of computing shearing stresses were available, it might not be possible to carry out in practice the conclusions to which it might lead. The vertical stirrups used in connection with bent up diagonal bar reinforcement serve the very useful and practical purpose of helping to hold the various bars in the beam in their proper relative positions, and practical considerations might step in to veto any considerable reductions of section of such stirrups on the ground of loss of that very desirable degree of rigidity which is afforded by the stirrups as commonly employed. The question as to what is the proper amount of shearing reinforcement is not one which is likely to be settled by deductive reasoning from the pure principles of strength of materials, but it is the writer's opinion that the actual stresses carried by diagonal bars, vertical stirrups, etc., are very much less than they are computed to be, and that a lighter form of reinforcement than that commonly used would be sufficient, if it could be devised to meet the conditions of practice as regards handling, etc. The American standard specifications for shearing reinforcement, and their theoretical basis will be explained in the next article, when a typical floor unit design will also be commenced.

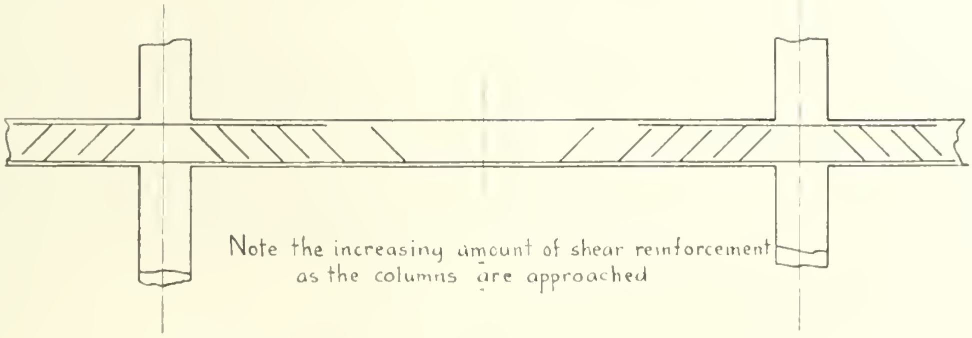

Note the increasing amount of shear reinforcement as the columns are approached

Fig. 14

Much plumbing work in Montreal is being held up as the result of an order issued by Mr. Dore, sanitary inspector of the city, prohibiting the use of Scottish pipes. Owing to the scarcity of Canadian pipes, large orders were given to Scottish makers, but Mr. Dore refuses to allow the use of these imported pipes as they do not conform to the bylaws, which stipulate that they should be moulded in one piece; further, they have plugs which, it is contended, may cause trouble later. Another objection is that the weight is not marked, as specified in the city by-laws. Mr. Dore believes that these pipes are not, from a sanitary point of view, as good as those made in Montreal, and he has ordered that the imported articles already used shall be taken out. He has, he says, nothing to do with the fact that work will be delayed because plumbers desire to use unauthorized material.

Montreal is to be connected by rail with the Grand Trunk Pacific by means of running rights over the North Railway, connection being given at Bell River. The company have a locating party at work, and they are expected to complete the first section of 250 miles from Nottaway, on St. James Bay, to Bell River by the end of the year, when contracts for the construction of this northern half of the James Bay line, as well as forty miles to the south of the Transcontinental, connecting the Grand Lake Victoria with the Grand Trunk Pacific, will be given out. A branch of the North Railway Company's project is to provide a joint railway and steamship service between the St. Lawrence ports and the heart of the wheat growing region.

Mr. James McCrea, president of the Pennsylvania Railroad Company since 1907, has resigned, to take effect January 1 next and will be succeeded by the present vice-president, Mr. Samuel Rea.

An Interesting Paper on the Dallas Road Sea Wall, Victoria, B.C.

THE protection of the foreshore at Dallas Road, Victoria, B.C., was the subject of a paper read by Mr. G. A. Duncan, Jr., at the last monthly meeting of the Canadian Society of Civil Engineers, Montreal.

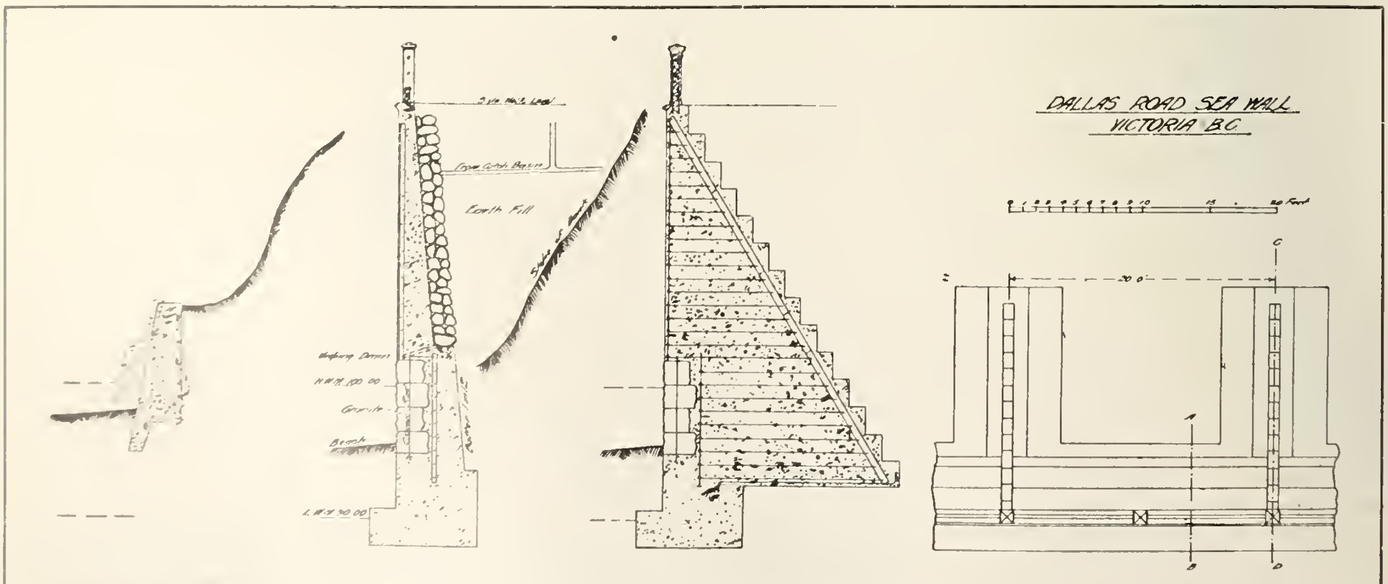
It was stated that for several years the sea had been encroaching upon a part of this roadway, which runs along the coast overlooking the Strait of Fuca, with the consequence that the banks were gradually being eroded. In 1901 the City Authorities commenced to build a low concrete wall to form some protection, and they continued building it in sections until it was about 1,500 feet in length in 1906. This wall, which had a height of six feet above high water, did not, however, prove of much service against the heavy seas which are prevalent during certain parts of the year. In 1910 the roadway was getting into a serious condition and the city authorities saw they would have to take immediate steps to form some permanent protection. A by-law was passed authorizing the expenditure of $75,000 which was augmented by the sum of $20,000 from the Provincial Government for the purpose of erecting more suitable protection works. The city authorities were in favor, and had the intention of building on top of the old wall, a proposal of which the Public Works Engineer did not approve on account of the unstable condition of the foundations and general state of the wall.

After close investigation into the local conditions and a careful study of the various types of walls elsewhere constructed with similar objects, the conclusion was arrived at that protection could be most effectively and economically attained by a vertical wall carried down into solid ground below low water mark, except at its termination where it was anticipated the depth might be materially reduced. Trial sections of a solid and of a reinforced concrete wall were made and it was found that the cost of the former would considerably exceed that of the latter.

A comparison was then made between walls with counterforts 16 feet and 20 feet apart, respectively, and the balance in favor of economy proved to be for the latter. It was therefore decided that the wall should be vertical, carried up to the level of the roadway, of a reinforced concrete type without a base plate, with counterforts at 20 feet centres, and with a belt of granite in its face where the wash of the sea was greatest. The calculations for the strains and areas of steel and concrete were then commenced and the following assumptions made:—That all steel used would have an elastic limit of 32,000 lbs. per square inch. That all rods should have a working stress of 12,000 lbs. per square inch and be capable of being bent, 180 ft. flat on themselves. These assumptions were subsequently required by specification. The reinforcement in the wall consists of horizontal rods one foot apart commencing with ¾-inch diameter at two feet from top of wall and increasing in diameter with the depth of wall. These rods are link jointed and are kept in place between each counterfort by two face plates each ⅜ in. x 4 in. at 6 ft. 8 in. centres. To the horizontal rods is wired expanded metal and No. 16, 1-inch mesh was at first used for this purpose but No. 10 3-inch mesh was afterwards substituted on account of the former being found to be too light and the mesh too small. The counterforts are reinforced in the same manner as the wall with horizontal tie rods hooked into face and back plates. It should be pointed out that these tie rods and also the horizontal rods in the wall are subject to shearing stress at their connections with the face and back plates of the former and at the link joints of the latter, a point which is very easily overlooked. The back plates consist of 6-inch plates, ¼-inch and ½-inch rivetted together.

At each counterfort the horizontal rods in the wall were at first placed between the face plate and the hooks of tie rods, but it was afterwards found that a more secure method was to place them at back of face plate and resting on tie rods of counterfort to which they were securely wired, and this method was adopted throughout the rest of the work. The bottom of all face plates are split and spread, and at the counterforts the face and back plates are held together by ⅝-inch bolts. The footings of the counterforts are reinforced with ¾-inch diameter rods at 4½-inch centres which are carried about two feet into wall and rods of same diameter at 7-inch centres and 7 feet long are placed between the bottom tie rods so as to thoroughly anchor the counterfort to footing.

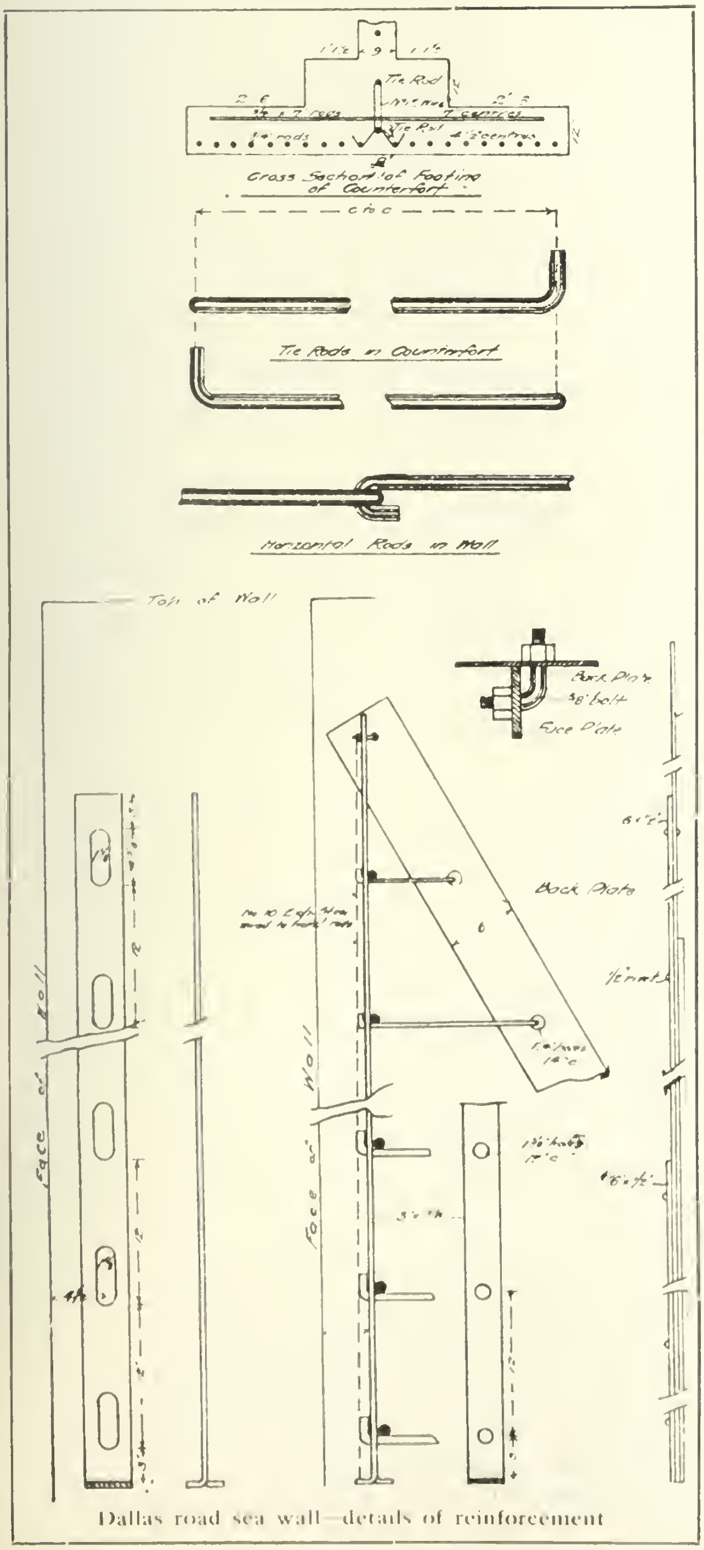
To protect the wall from the wash of the sea and batterings by drift logs, a belt of granite has been placed in the face of the wall as shown. Holes were drilled through the granite and ¾-inch diameter rods placed therein set with neat cement, thereby double clamping each stone. In the event of the cement mortar between the courses showing signs of disintegration the joints are to be raked out and caulked with lead wool. The lower part of the wall up to the shoulder, excluding the granite, is in the proportion of 1:3:6 concrete and all other concrete is in the proportion of



Section of Old Wall   Section A B   Section C D   Plan

1:2:4. All concrete was of a "wet" mixture and the cement used was Portland. The exposed face of the concrete is of cement mortar in the proportion of 1 part Portland cement to 3 parts sand deposited at the same time as the concrete, and lifting plates were at first used to ensure the bond, but spading was afterwards adopted as being found more satisfactory.

At the back of the wall a layer about one foot thick of broken rock is placed for facilitating drainage and a weeping drain of 3-inch drain tile placed in wall between each counterfort. The length of the wall is 1,680 feet, the greater part of which has an average height of 30 feet. It is finished on top with an iron pipe railing supported by reinforced concrete posts at 10 feet centres.



Dallas road sea wall—details of reinforcement

The work was done by contract and the total cost amounted to $119,020, divided up as follows:—Wall, $112,130; Convenience and steps to beach, $3,810; Railing, $3,080. February, 1912, but a great deal of delay occurred and time Work was commenced in January, 1911, and completed in was wasted through disputes. The plans were prepared in the Public Works Department by the author, acting under the instructions of Mr. Edward Mohun, M. Can. Soc. C. E., etc., who designed the work. Mr. A. E. Foreman, A. M. Can. Soc. C. E., was supervising Engineer and the contractor was the Pacific Coast Construction Company, Ltd., Victoria.

Effect of Sea Water on Portland Cement Concrete

The reading of the paper was followed by a discussion on the effect of sea water on Portland cement concrete structures.

Mr. John Kennedy referred at length to various experiments made on the North American Continent. In Nova Scotia, he said, there was considerable difficulty with concrete bridges on account of high tides. In the Bay of Fundy the currents and ice were important factors. If the porosity of the concrete were eliminated and the material made waterproof the difficulty would be overcome; there would be no freezing, and the disintegration would be stopped, but so far nothing has been effective. A number of firms had recommended their concrete as waterproof, but Mr. Kennedy expressed scepticism as to the efficiency of the materials. Some concrete in sea water had stood well, while other concrete adjoining disintegrated very badly—which made the problem puzzling. It had been found that where an old cofferdam had been left above the water surface, disintegration went on on the surface, but not below it. There were instances in Nova Scotian bridges where a covering of the surface of concrete had kept out the frost. If they could cover the surface for the six hours in which the water was low and so keep out the frost, the rising tide would do no harm. Some experiments had been made at McGill with a covering of wood, different kinds of concrete being used, and it was found that two inches was sufficient for Nova Scotia, but possibly three inches would have to be used for Quebec. Experiments were also made with creosoted wood, but there was practically no difference.

Mr. F. W. Cowie spoke of the difficulties in getting satisfactory results even in fresh water, when frost had to be considered. If the forms were not absolutely watertight the surface was not as good as it ought to be, and Mr Cowie referred to the work in Quebec and Montreal harbors and to the abrasions in the concrete walls of the Lachine Canal. In Montreal the use of footing blocks had been tried with good results; in that harbor they used an adaptation of the footing block by making a reinforced concrete shell, loaded in the air, with good results. Mr. Cowie then gave details of the construction of two piles, one of which was covered by a thin coat of steel. The unprotected pile was very seriously affected by frost, while the other was still standing. He was of opinion that the time had come for a series of comprehensive tests to be made.

Mr A. D. Swan believed that disintegration was due more to frost than to any chemical action of sea water. The disintegration of concrete was only a little more rapid in sea water than in fresh water. Tests extending over twenty years were being made in Scandinavia and in Germany, as the result of ten years' experiments in the former country it had been found that the action of salt water was less marked than was generally supposed. There was no objection to using salt water for mixing providing that the concrete was to be used in salt water.

Mr. W. J. Francis referred to the effect of frost on a mortar face to a concrete wall. The frost caused cracks on the outside, and he had abandoned the use of this mortar face. The question of mixing concrete was all important

Effect of Traffic on Bituminous Pavements*

By Isaac Van Trump, Engineering Chemist, Chicago

A new problem has arisen within the past year or two which the paving engineer must solve, and that is the deep ruts formed in bituminous roadways under exceedingly heavy traffic. The writer has in mind two boulevards, paved about 12 years ago with sheet asphalt. Until less than 2 years ago these thoroughfares were, after 11 years of constant traffic, still in perfect condition. During the summer of 1911 slight ruts appeared in the pavement, gradually becoming deeper until during the past hot season it became almost dangerous for a fast moving vehicle to use that portion of the street. In the writer's opinion this pavement, which had for 11 years been perfectly hard and stable, gradually become softened and displaced under the tremendously increasing automobile traffic and the minute oil drippings. It has been estimated that 17,000 vehicles, principally automobiles, pass over these pavements each day, a large percentage of which are homeward bound between the hours of 4 and 7 p.m., when the pavement, especially during the summer, is still warm and yielding from the hot sun.

It is, of course, well known that asphalt pavements become harder with age, but on the two boulevards above mentioned the condition of the pavement after years of service is reversed and it is now the problem of the paving engineer to prepare and lay a bituminous pavement which will not be seriously affected by the minute but constant dripping of oil and gasoline from automobiles. Neither is the above condition confined to sheet asphalt alone as a similar condition existed on another portion of one of these same boulevards, paved in 1907 with bituminous concrete containing a coal-tar binder. Deep ruts appeared in this pavement within 2 years after laying, making it necessary to resurface the entire roadway.

Some few municipalities are advocating the elimination of the binder course. In many instances to economize in this matter is a serious mistake. A dense binder not only acts as an anchor for the wearing surface by giving added rigidity and stability to it, but it also protects the upper surface to a considerable degree from the deleterious action of water and illuminating gas from beneath. Many concrete foundations exude moisture under certain atmospheric conditions. The opportunity for street liquids to get beneath pavements from along car tracks, gutters and headers, and around manholes and catchbasins is great. Where no binder is employed, these liquids have easy access to the under side of the wearing surface.

To prevent the wearing surface from creeping under traffic some municipalities substitute a paint coat in place of a binder course between the concrete base and the surface mixture. Theoretically a paint coat forms a perfect bond between the two courses, but at best it is difficult and inconvenient to prepare and apply, and unless the conditions on the street are ideal the practical results are frequently entirely different from those obtained in theory.

Also for the purpose of overcoming the tendency of the wearing surface to shove under traffic, several cities have recently adopted what is known as "anchor concrete," a form of construction patented by W. B. Brady, of Chicago. Anchor concrete is merely a slush coat of cement mortar spread ½ in. deep upon the freshly laid concrete foundation. Before this slush coat has received its initial set, clean, hard, broken stone about 1½ to 2 in. in diameter is spread evenly over it and imbedded into the slush coat by light tamping. When dry, this produces a very rough but rigid surface and acts as an anchor for the topping which is laid directly upon it. This form of construction is especially effective on steep grades.

Where the traffic is light, such as on suburban or residential streets, it may be possible to eliminate all forms of intermediate courses and lay the wearing surface directly on the concrete base, but to do away with the binder course generally, as a few municipalities have recently done, regardless of traffic or other conditions, is a serious error.

The City Economic*

By Louis L. Tribus, Consulting Engineer, New York

It is not sufficient that a city engineer should know how to design a water or sewerage system, or suitable grades for a street, or even suitable lines and widths for the streets, but his studies should reach to the heart of affairs, to the lives of those who live and work in the cities and who pay the bills. Suitable sanitary structures, of course, are absolutely essential, and equally important is convenient transportation, without discomfort and unnecessary loss of time or undue expense. The worker should be able at the minimum expense of time and money to earn his wage, to raise his family, to enjoy the necessities and privileges of pure light, water and air, and to secure helpful education and recreation, both intellectual and physical. The factory, shop or store should receive supplies and deliver output with economy of transportation and time. The central civic features, such as public buildings, large parks, waterfront development and specially important and extensive educational, historical and art institutions should be within easy reach of all portions of the community. Public transportation lines should be so designed as to deliver to and take from the various lesser centers which will develop in meeting the foregoing conditions, the thousands of people who would seek at times the greater centers, without congestion or discomfort and at equal cost to all.

Intelligent study by municipal engineers of the economic as well as the physical problems is necessary as the education of the community so that it will place in office men and women who will study its best welfare, and give to those officials loyal support, intelligent advice and full co-operation.

Expenditures for articles purchased or improvements made that have a life extending through a term of years are justly open to three methods of meeting the cost; first, including the whole in the first annual tax levy; second, charging in each succeeding tax levy the proportion of the total cost plus interest charges, as divided by the number of years through which the article or improvement has existence or value; third, issuing municipal bonds for the total cost and including in the tax levy interest and sinking fund payments which, accumulated by the expiration of the period of benefit, will equal a sum sufficient to retire the bonds. In each case, of course, practically immediate payment must be made for the work done, or article purchased, with money provided by use of sinking funds or loans; the third method is by far the most popular; the second has much to commend it, while the first, if the policy was continued through, say, a period of fifty years, would actually be the cheapest for the community.

The first is a policy that is being very largely adopted by great private corporations, stockholders recognizing that, though their dividends may be deferred for a time, they are surer for the future if betterments are made from earnings. This policy, of course, could not well be adopted for the most costly improvements, those in the larger cities aggregating many millions of dollars; for such, the issuance of long term bonds would seem to be the only possible solution, and with some justice, in deferring part of the expense to succeeding taxpayers who share in the benefit.

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* Abstracts of papers presented at the recent annual convention of the American Society of Improvements, held at Dallas, Texas.

Great Building Progress at Calgary

Continued Activity in All Branches of Constructional Enterprise—Details of the More Noteworthy Undertakings

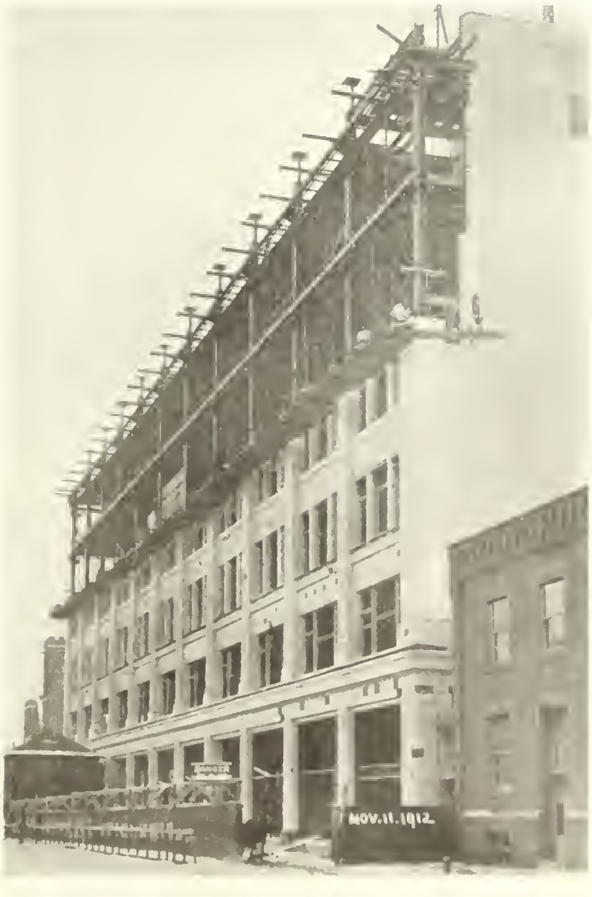
Correspondence of the Contract Record

CONTINUED warm weather has enabled local contractors to make great headway on all buildings and has encouraged the commencement of operations on several large buildings. Permits to the amount of $1,595,000 were issued during the month of October—nearly double the value of the permits during the same month of 1911. The total value of building permits for the first ten months of the year amounts to $17,457,000 as against $11,664,000 for the same period of 1911, a gain of nearly 50 per cent. Calgary now stands third in the Dominion in the value of building operations commenced to date for the year.

The excavation for several new buildings has been commenced so that the superstructure can be rushed to completion from the opening of the warm weather in the coming spring. Among the large new buildings are the Empire theatre building, the Southam building for the Calgary Furniture Store, Ltd., two large warehouses for harvesting machinery, the Customs examining warehouse and other smaller buildings. Rapid progress has been made on the work of closing in many other large buildings, notably the new C. P. R. hotel, the Herald building and the Hudson's Bay store.

The accompanying cut gives some idea of the magnitude of the new $1,500,000 departmental store for the Hudson's Bay Company and shows the progress the contractors have made. The facade shown is along Seventh avenue, 245 ft. long, and with the other street face, 130 ft. long. The building is faced with white architectural terra cotta. All of the ornamental terra cotta was furnished by the American Terra Cotta Company, of Chicago, and was laid from 42 "New York" patent safety scaffolds, furnished by the Tregillus Clay Products Company, of Calgary. The two alley fronts are of buff face brick, of which there were 250,000 used, there being a total of 1,500,000 brick laid in the building. Hope steel sash are used throughout the building, there being 182 sash, 5 ft. by 6 ft., used in the brick walls. Ten Otis-Fensom electric elevators will be used—five freight and five passenger cars. Since the building is all but enclosed, all the trades are making rapid progress. The entire mechanical equipment except electrical work is being furnished and installed by the Evans Almerall Company, of New York, and includes plumbing, heating, vacuum, and sprinkler systems. There will be four 200 h.p. Babcock & Wilcox tubular marine boilers required for the heating system, which will be a 2 pipe system. Messrs. Carter-Halls-Aldinger Company, Limited, of Winnipeg, are the general contractors.

Mr. R. A. Brocklebank, of Calgary, has about completed the contract for the $150,000 Oddfellows' Hall. This is a four-storey and basement reinforced concrete building, 70 feet by 110 feet. The exterior is of sandstone, with pressed brick panels. Offices and stores occupy the first three floors, the fourth being devoted entirely to the uses of the organization, which is 2500 strong in this city. Besides a banquet hall and reception and amusement rooms, there is on this floor an arched ceiling in the form of an ellipse, 34 ft. 6 in. wide, with a rise of 6 ft. This is shown in the cut, the roof rising above the main building. Three arched girders, 18 ft. apart, support the ceiling and roof, being carried on 18 in. square columns as shown. The girders are 28 in. deep below the 8 in. roof slab, with a 42-in. T, and are 14 ins. thick, reinforced with Kahn bars at the centre and with rods running from the top of the girder into the columns for negative bending moment and for any bending in the column itself. The Kahn system of reinforced concrete was used, the floors being combination terra cotta and concrete. Eight thousand sq. ft. of terra cotta blocks, furnished by the Alberta Clay Products Company, of Medicine Hat, 108 tons of reinforcing steel, and 875 cu. yds. of concrete were required in the structure.



Hudson's Bay Store, Calgary

Principal among the new buildings for which the excavation is about completed is the new structure for the Empire Theatre, to be constructed by Senator Lougheed on the site of the present theatre. Eventually this building will be 200 feet along Eight avenue, and 130 feet deep along First street west, abutting the new Hudson's Bay store. The structure will be ten storeys high. At the present time only 100 feet and six storeys will be built, owing to the necessity of providing new quarters for the Vaudeville Circuit. The building will be of reinforced concrete, with brick exterior walls backed with terra cotta blocks, except the street fronts, which will be of ornamental terra cotta. There will be stores on the ground floor, with office suites on all other floors, there being a total of over 13,000 sq. ft. of office area in the first building. The theatre will have a maximum seating capacity of 1275 on the main floor and in two balconies. The roof trusses over the theatre will be of steel, as will the proscenium girder. The proscenium opening will be 22 feet high and 35 feet wide in the clear; the stage will be 28 feet deep by 60 feet long. In the basement there will be a cafe and restaurant, besides the theatre dressing rooms and the boiler and engine rooms. Messrs. H. L. Stevens & Company, of Vancouver, are the architects. The estimated cost of the first portion is about $350,000.

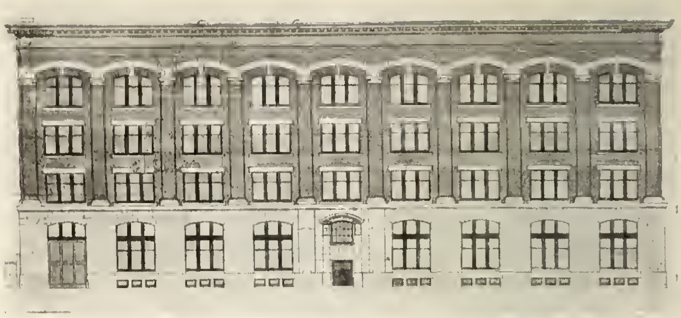
Messrs. Jones & Lyttle, Ltd., of Calgary, have the contract for a large warehouse to be constructed for the Cockshutt Plow Company, Limited. The building will have an entrance frontage of 120 feet and will be 100 feet deep. The exterior walls will be of solid brick with sandstone trimmings. Slow-burning mill construction will be used for the interior, with enclosed elevator shafts and stairways. Hollow metal windows and doors, wire glazed, will be used throughout. The building will have a basement and will be five storeys above ground. The cost will be about $140,000. The architect is Mr. S. Frank Peters, of Winnipeg.

Excavation has been commenced for the new warehouse to be constructed for the Massey-Harris Company. The building will be four storeys high, of regular warehouse construction, having an exterior of face brick and sandstone trimmings, and will cost about $125,000. Mr. A. P. Horner, the local representative of the Canadian General Electric Company, Limited, has announced the intention to build a warehouse 50 feet by 120 feet and four storeys high, to cost about $100,000.

A permit has been issued for the construction of the first building for a sand-lime brick plant to cost $200,000 when completed. The building will be 100 ft. by 118 ft., two storeys high, and will contain the first units with complete mechanical equipment for the plant. The present equipment will consist of two 150 h.p. boilers, requiring a smokestack 80 feet high and 54 inches in diameter, with a 125 h.p. engine for power. The plant will be constructed according to the Kromnick system for sand-lime brick. The engineers are Messrs. Nesbitt & Langdale, and the contractors Messrs. Nesbitt & Miller, both of Edmonton.

One of the largest contracts pending is for the new Customs Examining Warehouse, of which the front elevation is shown in the cut. The building will be 200 feet long and 112 feet deep. Four storeys are to be built at once, with provision for the addition of two other storeys. The exterior of the ground floor will be of Calgary sandstone, while the upper storeys will be of local red face brick with sandstone trimmings. The building will be used for examining rooms and offices. The interior construction will be of fireproofed steel with reinforced concrete floors and partitions. The interior space will be separated, by partitions, into three large enclosures with Fenestra steel sash throughout. The trim will be of B. C. fir. There will be four freight elevators, with provision for two others, and one passenger elevator, with ornamental iron enclosures. In addition there will be a wide enclosed stairway on the front in the centre. The building was designed in the office of Mr. David Ewart, Government Architect at Ottawa. Mr. Leo. Dowler will be the local supervising architect. The estimated cost of the building completed will be about $500,000. The following is the Fair Wages Schedule required for the construction: stonecutters, 65c; bricklayers, 67½c; stonemasons, 67½c; carpenters, 55c; plasterers, 68¾c; lathers, $3 per m.; painters and glazers, 35c; plumbers and steamfitters, 60c; sheet metal workers, 45c; electricians, 55c; steel erectors, 50c; common labor, 25c. All of these are for 8-hour days except for the carpenters, which is for a 9-hour day, and for common labor, which is for a 10-hour day.

Oddfellows' Hall, Calgary



Customs Examining Warehouse, Calgary

From the Federal Capital

Correspondence of the Contract Record

Ottawa, Ont., November 30, 1912.

CONSTRUCTIONAL activity still continues in Ottawa. The mild weather during the past fortnight has given the contractors time to rush their contracts to completion. Gangs of men have been working night and day on several of the large reinforced concrete buildings under construction. The Jackson Booth building on Sparks street (seven storeys), and the Masonic Temple on Metcalf street (five storeys), have all the concrete work completed. Blackburn Brothers' building on Sparks street, ten storeys high, has all the steel work finished and the stone facing has been commenced. The boom in building construction in Ottawa at present has certainly broken all records.

Laurentian Club

This building, erected at the corner of Elgin and Albert streets for Messrs. Stewart, Larmoth & McNeil, is practically completed, externally, and makes a handsome addition to the buildings of the Capital. The cost is estimated at $100,000. It is constructed of reinforced concrete on the Kahn system. The mixture used for the concrete foundation, walls, piers, columns girders and floor slabs is 1:2:4, the specific gravity of the cement not being less than 3.10, and when passed through a sieve (No. 100) leaving not more than an 8 per cent. residue. All concrete floor slabs are figured for a uniform live load of 75 lbs. per square foot. The sill course on Albert and Elgin streets is of local limestone, and the walls above to the belt line of second floor are of Indiana limestone. The panels in circular heads over second storey windows are of Roman Stone. The elevations on Albert and Elgin streets, above the first floor, are faced with brick costing not less than $33 per thousand. Over the main entrance on Albert street will be erected a handsome cast iron marquise, supported by brackets and covered with obscure glass. The floor of the main vestibule and lobby will be finished with white marble mosaic, and throughout the building will be used Verde Antique and Italian marble.

The ground floor of the building will be utilized for offices and club room; the second floor for dining rooms, lounging rooms and kitchen; the third floor for billiard and card rooms, and buffet; and the fourth floor for bedrooms.

The structure was designed by Mr. A. LeB. Weeks, of Ottawa, and the firm of Messrs. Shuttleworth & Black, Ottawa, were the general contractors.

Chalmers Presbyterian Church

The church and Sunday school have a frontage of 136 feet on O'Connor street and 135 feet on Cooper street. The Sunday school is being built on the north side of the lot and is 51 feet by 109 feet. The church building is 85 feet by 137 feet. The exterior of both buildings will be Nepean stone, rock face, built at random with trimmings of olive green Miramichi sandstone, and with a base of dressed limestone The front is flanked with two towers; one, the main tower, is at the angle of the two streets, and the other tower, which is of less height, will be finished as an octagon. The building is designed after the Romanesque architecture of Southern France adapted to modern requirements. The auditorium of the church is square in plan with octagon inscribed, and has a vaulted ceiling and dome supported on eight massive columns. The main entrance to the church will be on O'Connor street.

A special feature of the new church is the heating and ventilation of the auditorium, which is done by hot or cool air being forced by a fan through concrete ducts below the floor and distributed so as not to cause draughts.

The architect is Mr. Alex. C. Hutchison, R.C.A., of Messrs. Hutchison, Wood & Miller, Montreal, and Mr. Alex. Gasoock is the builder.

Hall of Ottawa

This building, which is being erected on Gloucester St., for the Roman Catholic Episcopal Corporation, at a cost of $10,000, is now having the roof constructed. The type of roof used is the Metropolitan system of fireproof roofing. A three-inch gypsum slab is used, reinforced with cables placed 1¼ inches apart, and these are secured to steel pushing. This is the first building in Ottawa to use this kind of roof which is noted for lightness and rapidity of erection. Mr Colborne S. Meredith is the architect. (This building was described in the "Contract Record" of August 7th last).

A new trolley electric line is contemplated by the Canadian Northern Railway Company between Ottawa and Rideau Junction. The car used will be a combination of the electric and gasoline, and will be similar in style to the ones used at present by the Ottawa Eleccric Railway on the Britannia line The C. N. R. will commence operations on their new station at Rideau Junction next spring.

New Intake Pipe

The 2,400 feet of 12 inch steel pipe has been completed The stipulated time was December 1st The contractors, Messrs. Laurin & Leitch, of Montreal are entitled to a bonus of $2,000, a bonus of $200 having been given for every day before December 1st that the pipe was completed. The pipe has proved very satisfactory, having been tested with a pressure of twenty pounds without a leak being observed, while under ordinary conditions the pipe will only be subjected to a pressure of five or six pounds The pumps are on hand now and should be placed in position in a week or two.

At a special meeting of the City Council last week, Mr. Hazen submitted his report and plans for the new filtration plant (mechanical) and also for the tunnel carrying the clear water from Lemieux Island to the mainland. The council approved of the whole scheme and the plans now await the approval of the Provincial Board of Health. The estimated total cost of the work, with the necessary pipings and connections, is $1,100,000. This amount will provide a plant to supply 35,000,000 Imperial gallons of water per day. The tunnel part of the scheme will cost $202,000, which includes the necessary shafts. The tunnel will be 2,250 feet long and will be driven through solid rock. From the top of the tunnel to the bed of the river it will be 27 feet, or about 53 feet below water level. The tunnel will be large enough to serve a plant supplying 70,000,000 gallons per day. From the tunnel to the pumping station a 72-in. steel pipe, embedded in concrete, will be laid at a cost of $90,000. A steel bridge from the mainland to Lemieux Island is included in the estimated cost. This alone will cost $30,000.

The plant will be built so that additions can be made from time to time. —L. H.

The Durability of Grouted Granite Pavements*

By William A. Howell, Engineer Streets and Highways, Newark, N. J.

In the city of Newark, N. J., on Nov. 1 there were 12.51 miles of completed grouted granite pavement covering 235,825 sq. yd., laid under public contract at a cost, including inspection and advertising, of $922,214. About 0.8 mile of this pavement has been in service three years and 3 2/3 miles is at least two years old. The important part of the work of producing a satisfactory grouted granite pavement, with close joints, is the preparation and application of the grout mixture. In Newark the specifications for grouted granite pavements are those adopted by the Association for Standardizing Paving Specifications. The grout mixture must be at least as rich as one part of cement to one part sand; the exact proportions depend upon the hardness of the granite used, and this quality should be ascertained by experiment so as to produce a grout which will wear down uniformly with the granite.

The very hard granites are not well adapted to this type of pavement, but there is no question as to the durability of the grouting where comparatively soft granite is used and where the specifications are rigidly adhered to. Horses very seldom fall on grouted granite block pavement, even when the grades are moderately steep.

To secure a good grouted pavement of granite blocks, the following points should be kept in mind: Be sure the sub-grade is well rolled and all soft places eliminated The concrete base should not be too rough and there should be a uniform thickness of 2 in. of sand under the blocks The blocks should be carefully culled and well rammed A small percentage of loam in the sand, not over 5 per cent., is desirable as a binder. The sand and cement should be mixed in the proper proportions, and the mixture should be continually agitated. The blocks should be thoroughly sprinkled immediately before grouting. Grouting should not be attempted during cold weather; good results are seldom secured after Nov 15 in the latitude of New York City If grouting is done during very hot weather the finished work should be covered with ½ in. of sand and kept moist Traffic should be kept off grouted pavements for at least seven days after completion The use of a moderately soft granite similar to New Hampshire granite, is recommended

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*Extract of Paper presented at the Annual Convention of the American Society of Municipal Improvement.

Remarkable Development at Vancouver

New Building Record Established During Present Year —C. P. R. Depot and Other Important Projects Described

Vancouver, Nov. 28, 1912.

BUILDING permits issued at Vancouver during the month of October furnish unmistakable evidence of the remarkable development which at present is taking place both in the commercial and constructional life of this rapidly expanding city. The amount represented by permits issued during this period reached a total of $3,597,165, which is over two million dollars in advance of the figures for October, 1911, and creates a new record in the line of constructional activity for Vancouver.

The total value of buildings erected during 1911 amounted to over seventeen and a half millions of dollars, which exceeded the total for 1910 by four and a half millions. The first ten months of the present year give promise that this year will again show a substantial increase. The value of permits issued during this period amounted to $16,319,262. For the corresponding period in 1911 the figures were $15,065,645.

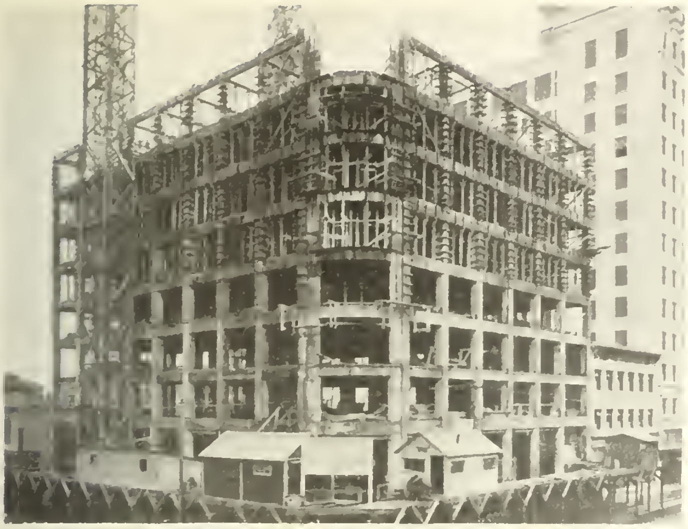
Building operations throughout the adjacent municipalities of Point Grey, South Vancouver and Burnaby show increased activity each month. The rapid development forecasted in Point Grey district following the settlement of the tram franchise, has been well borne out, in fact, Point Grey building permits for October were valued at $230,735 compared to September, with permits valued at $174,820. Since the building department started in May last there have been issued 390 permits, with a value of over $1,500,000, which exceeds the total reached by any other municipality during the same period.

The largest individual building permit ever issued at Vancouver was taken out recently by the C. P. R. for the new terminal passenger station on Cordova street, the amount being $1,000,000. The proposed new building is to be of steel frame, with steel grillage and concrete foundations, brick walls with stone and terra cotta trimmings, fireproof floors, roof and partitions. There will be four passenger elevators and one freight elevator. The architects for the building are Messrs. Baratt, Blacker and Webster, Montreal, and the contractors, the Westinghouse Church Kerr Company, Ltd., Vancouver.

A force of about 100 men is now busily engaged at the Hotel Vancouver, tearing down the old power house and laundry to make room for the new six-storey wing which is to connect the Howe street wing with the portion of the

Vancouver Block, Granville Street—Taken from top of newly erected power house shaft at Hotel Vancouver

New addition to B. C. Sugar Refinery Company's plant, completed recently by The Norton Griffiths Company



Progress view of construction on the Henry Birks Building at Vancouver

hotel facing on Granville street. Another large gang is also working in the interior of the hotel, where alterations are in progress pending the demolition of the central portion of the building.

Within the past month considerable progress has been made on the new St. Paul's Hospital at Vancouver. The reinforced concrete frame is now completed, and work is being rushed on the exterior facing of pressed brick with terra cotta and stone dressing. The cost of the building is estimated at approximately $400,000. Mr. R. F. Tegen is the architect, and the Norton Griffiths Steel Construction Company have charge of the contract.

Construction work is advancing rapidly on the new London Building, which is being erected on Pender street, Vancouver. The exterior stone facing has been completed to the full height of eight storeys, and a force of carpenters and plasterers are now engaged on the interior finishing. The Ferro-Concrete Construction Company have charge of the contract, which is valued at approximately $250,000.

The cut produced herewith shows the large addition to the B. C. Sugar Refining Company's plant on Powell street, Vancouver, which was recently completed by the Norton Griffiths Company The building measures 75 x 120 feet, and is of steel frame and brick construction, with reinforced concrete floors The structure represents an outlay of $150,000.

Work has recently been started on a two-storey cold storage warehouse at the corner of Richards and Pacific streets, Vancouver, for the Merchants Ice & Cold Storage Company. The building will be of reinforced concrete, and will be faced with concrete. It will occupy a site measuring 300 x 100 feet. An up-to-date ice-making plant will be operated, in the basement, while the two upper storeys will be given over to a cold storage warehouse and an office for the company. Absolutely nothing about the construction will be wood, the doors and window frames being of metal The Norton Griffiths Steel Construction Co. who are in charge of the contract, have orders to complete the building within 60 days Should this be accomplished within the time stated, a new record for rapid concrete construction work in the city will have been established Mr Thomas Hooper is the architect

An early start will be made on the construction of a six-storey hotel building near the corner of Richards and Pender streets, Vancouver. Although of mill construction, this structure will have steel beams for the major supporting columns. Buff pressed brick will be used for the interior The building will contain 110 rooms, and will cost $75,000. Mr. Otto Moberg prepared the plans, and Mr. H. Murray will have charge of the general contract.

Plans for a dock to be built on Mr. F. L. Carter-Cotton's property on Burrard Inlet, Vancouver, were recently filed in the land registry office. The wharf will front on 340 feet of waterfrontage, lying between Campbell avenue and Raymur avenue, and immediately to the west of the Sugar Refinery wharf. It is proposed to extend the pier out for a distance of 1,600 feet into the inlet.

The city of New Westminster recently let the tenders for the Sapperton new sewerage works, which will include 7¾ miles of sewerage. The tenders were as follows: "A" section, Northwest Municipal Construction Company, $62,836.55; "B" section, Powers Contract Company, $46,965.45; outfall, T. R. Nickson, $64,021. The council accepted the tender of the Pacific Lockjoint Pipe Company for reinforced concrete pipes, the sum being $43,000. The council preferred this class of pipe to metal pipe.

By-laws for the construction of roads and sidewalks in the third ward of Burnaby municipality were recently endorsed by the electors in that district. The Road By-law will authorize the municipality borrowing $250,000 for street improvement purposes and road improvement. The Third Ward By-law provides for the borrowing of $50,000, with which to build additional sidewalks.

The firm of Dutcher, Maxwell & Company, consulting engineers, Vancouver, was recently organized to take in as partners: Mr. Charles G. DuCane, formerly with Sir John Wolfe Barry, and consulting engineer for the Norton Griffiths Company; and Mr. Hugh B. Ferguson, who was resident engineer for the Guggenheim interests on the Yukon hydraulic mining projects, and later, in charge of the Quesnel Hydraulic Mining & Cariboo Hydraulic Company projects. The firm will in future carry on a general consulting engineering practice under the firm name of DuCane, Dutcher & Company, and with the work already in hand, including two hydraulic projects, one involving nearly half a million dollars expenditure for Kamloops, and the consulting engineering for six cities in the West, together with several new harbor and other projects under construction, this firm is rapidly taking a leading position in the engineering problems of the West. The firm have taken Suite 911-14, Rogers Building, for their new quarters.

Mr. Wm. Douglas Caroe, F.S.A., a well-known English architect, passed through Vancouver recently on his way to Victoria. Mr. Caroe has been engaged by the B. C. Government as the leading member of the Commission to pass on the plans for the new provincial university

Constructional view, St. Paul's Hospital, Vancouver

Personal Mention

Mr. Willis Chipman, of Toronto, has been retained by the town council of Sarnia as consulting engineer on the waterworks system.

Mr. Virgil G. Bogue, a well-known New York engineer, has been retained in a consulting capacity by the Canadian Pacific Railway in connection with the double-tracking of the main line between Vancouver and Calgary.

In succession to the late Mr. R. T. Hopper Mr. A. A. Ayer has been appointed president of the Dominion Marble Company, Limited, while Mr. A. F. C. Ross has been appointed a director. Mr. Ayer was at one time connected with the Laprairie Brick Company.

On November 25, Mr. Arthur H. Blanchard, M. Can. Soc. C. E., Professor of Highway Engineering in Columbia University, delivered an address entitled, "The Art and Science of Highway Engineering," at the celebration of Founder's Day at the Clarkson School of Technology.

Among the new Senators recently appointed is Mr. Nathanal Curry, who is on the directorate of eight companies. In addition to being president of Canadian Car and Canadian Steel Foundries, he is on the boards of the Bank of Nova Scotia, Camaguay, Canadian Light & Power, Hewsons, Montreal Trust, and Sterling Coal.

On Thursday, November 28, Mr. E. L. Cousins, Engineer to the Toronto Harbor Commission, addressed the members of the Toronto branch of the Canadian Society of Civil Engineers on the proposed harbor and lake front improvements at Toronto. The meeting was an overflow one and the greatest interest was evidenced in the plans and sections shown.

Mr. W. M Oliver, mechanical engineer, has made arrangements to associate himself with Herbert Morris Limited, manufacturers of cranes and other lifting and shifting machinery. Mr. Oliver, whose experience has been gained with some of the leading firms in Great Britain and the United States, is thoroughly familiar with the practical side of this branch of engineering. He will act as engineer-representative in Toronto and the district immediately surrounding it.

Mr J. S. MacLachan, of Victoria, has been appointed resident engineer in charge of federal public works at Vancouver Island. Mr. MacLachan is a graduate of the Royal University, Ireland, and is an Associate Member of the Institute of Civil Engineers. He has had extended experience in the design and construction of bridges, retaining walls, dams, drainage work, etc. From 1905-11 he was construction engineer for the Board of Public Works, Ireland. He left that position to become assistant engineer on the Para Harbor Works in Brazil.

At a meeting of the electrical section of the Canadian Society of Civil Engineers, Montreal, on November 21, Mr. Julian Smith, chief engineer of the Shawinigan Water & Power Company, read a paper on transmission lines. The paper covered the entire field of the construction, operation, and location of these lines. Mr. Smith giving elaborate data as to the electrical end, and describing the putting together and testing of the lines. He also compared the systems of concrete and steel anchors. In a discussion which followed preference was expressed for concrete anchors.

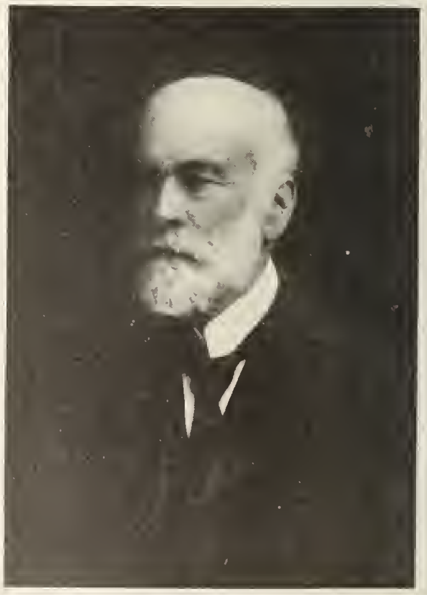
Mr. Cyril J. Atkinson, M. I. Mech. E., inventor and patentee of the Atkinson gas producer and a number of special devices pertaining to gas producers, has severed his connection with the Dornfeld-Kunert Company of Watertown, Wis. Mr. Atkinson's services and the use of all his patents have been secured by Fairbanks, Morse & Company, and a number of Mr. Atkinson's valuable patents will be incorporated in the Fairbanks-Morse gas producers at once. This company will place Mr. Atkinson's services at the disposal of the public for adapting the Fairbanks-Morse gas producers to meet the requirements of the various industries desiring to substitute producer gas for fuel oil. This will be of particular service and effect large economies in forge shops, malleable iron foundries, galvanizing plants, enamelling works, brass foundries, etc.

As announced in our last issue, a change has taken place in the management of the Canadian head office, Montreal, of Messrs. Escher Wyss & Company, engineers, Zurich, Switzerland. Mr. Thv. Heyerdahl, who has been in charge for several years, is leaving for Europe shortly, and his place is taken by Mr. Th. Seidhl. Mr. Seidhl is a graduate of the University of Munich, Bavaria, and started his career as an engineer as designer of water turbines at Escher Wyss & Company's works; later he worked in the pumping and steam turbine department of the company's business in Great Britain and the Colonies, with offices in London. After Mr. Heyerdahl's decision to leave Canada, Mr. Seidhl was appointed as his successor. Messrs. Escher Wyss & Company are makers of the well-known water wheels, turbines, and impulse wheels, and have installed their products in all parts of the world.

Canadian Consulting Engineers

Mr. John Kennedy, Montreal

Mr. John Kennedy, Hon. M. Con. Soc. C. E., M. Inst. C. E., M. Am. Soc. C. E., Consulting Engineer of the Montreal Harbor Board, comes from a family which for four generations has been connected with engineering in one form or another. His father was the late Mr. W. Kennedy, who founded the firm of William Kennedy & Sons, Limited, at Owen Sound, Ont. Born in Spencerville, Ont., in 1838, Mr. John Kennedy was educated at the Ottawa Grammar School and afterwards studied at McGill University. His entry into the engineering profession was under Mr. T. C. Keefer, who was then constructing the Montreal water-



Mr. John Kennedy, Montreal

works. Mr. Keefer was also engineer for the Montreal Harbor, and Mr. Kennedy worked on plans for the improvement of the port, so that his connection with harbor matters has spread over many years.

The next positions were in Hamilton and Toronto, still with Mr. Keefer, whose head offices were successively in those cities, and he did a large amount of general engineering work. In 1862 Mr. Kennedy was appointed assistant engineer to the Montreal Harbor Board. Yet another change was made a little later by Mr. Kennedy, who became the deputy surveyor for the city of Montreal, followed by the managership of a mining and smelting plant at Ironsides, on the Gatineau, near Ottawa. After the close of the iron works, Mr. Kennedy was appointed divisional engineer on the Wellington, Grey, and Bruce Railway, a branch of the Great Western Railway System. Soon afterwards he was made resident engineer and subsequently chief engineer of the whole Great Western Railway System.

In 1875 he resigned to take up the position of chief engineer to the Montreal Harbor Commissioners, and as such had charge of the improvement of the Montreal Harbor and of the deepening of the ship channel between Montreal and Quebec, which latter work was carried on by the Harbor Commissioners until 1888. As engineer of the ship channel works, Mr. Kennedy deepened the channel from 20 feet to 27½ feet depth at low water, and located the lines of the channel at such important places as Richelieu Rapids, Cap a la Rocha, Batiscan and Becancour Traverses, the Contracoeur Channel, and the Varennes Channel, and others. As engineer of the Montreal Harbor works Mr. Kennedy built or re-built three-fourths of all the wharves in the harbor, including the building of the Guard Pier, the entire remodelling of the harbor between the Victoria Pier and Point St. Charles, and the building of the high level wharves therein. Mr. Kennedy continued in office until 1907, when loss of sight obliged him to resign. The Commissioners on accepting his resignation appointed him their consulting engineer, which position he now holds. Loss of sight slowly became total, but it is a tribute to Mr. Kennedy that notwithstanding he is able to continue his professional work; he has with great courage adapted himself to the changed conditions, and his advice is often sought by the Dominion Government, Harbor Board, and other bodies on matters on which his experience enables him to give expert opinions. He has recently represented the government in important international questions relating to the navigation of the St. Lawrence and the Great Lakes, and is now engaged on important government works for the improvement of the Deep-Water Terminus of the Intercolonial Railway at Halifax.

Mr. Kennedy has also been constructing or consulting engineer for different water power projects, including Niagara Falls, Chaudiere Falls, Ottawa; Winnipeg at Kenora, Beauharnois and others.

Mr. Kennedy was one of the founders of the Canadian Society of Civil Engineers, served several years on its council, is a past president and was subsequently elected an honorary member. He has served on the Board of Directors of the American Society of Civil Engineers and on the Council of the Institute of Civil Engineers, England, and is Chairman of the Canadian Advisory Committee of the latter body. He has taken an active part in business matters, having been on the boards of different mining and industrial companies and on those of benevolent and charitable institutions.

Mr. Justice Dunlop recently delivered an important judgment at Montreal, in deciding that the Montreal Tramways Company were liable for damages for injuries received by Mr. J. E. Bastian whose delivery van skidded owing to the tracks not being flush with the level of the road.

Mainly Constructional

The News in Brief—From the Atlantic to the Pacific.

Waterworks by-law estimates for Vancouver, B.C., will total approximately $750,000.

The new public library at Moose Jaw is now rapidly nearing completion and is expected to be opened in the course of the next month or so.

The National Brick Company, Montreal, are now owners of the Laprairie Brick Company, the last of the latter's shares having been transferred.

Outside civic work has practically closed for the season at Victoria. Very satisfactory progress has been made on paving and sewer work during 1912.

Negotiations are in progress for another model city just outside Montreal. Much of the land has been purchased, and the negotiations are for further capital.

Building permits at Winnipeg for the year 1912 are expected to reach a total of $20,000,000. The amount now wanting is little more than half a million dollars.

The new West End Y.M.C.A. building at Toronto was formally opened recently. This structure, which has a floor space of 58,002 square feet, was built at a cost of $173,052.

The building committee of the city council of New Westminster have decided to place a time limit of five years on the old-fashioned frame buildings at present in the city.

December 7th has been fixed as the latest date for architects to send in their competitive plans for the proposed $250,000 city hall for Moose Jaw. The award will be made prior to the end of the year.

Tenders for the new $1,000,000 technical school at Toronto are to be in by January 7th next, when contracts will be awarded. The plans are now in the hands of the Acting-Minister of Education for formal approval.

From the first of the year to November 22, permits for structures aggregating in value $7,217,000 have been issued by the building inspector of Victoria. For the entire twelve months last year the building figures reached a total of $4,026,000.

At a special meeting of the city council of Winnipeg it was decided to submit, at the coming municipal elections, a by-law authorizing the city to borrow $1,250,000 for the purpose of increasing the supply of water from the temporary artesian well system.

The City Controllers of Montreal are taking steps to let contracts for materials, in order that work may be commenced as early as possible next year. Paving and other improvements have been held up in previous years owing to the late date at which contracts were let.

The Good Roads by-law for $100,000 will be sent to the people of Toronto on January 1st next, council having recently passed the ordinance without discussion. The money is to be granted to the York Highways Commission for improvement of main roads leading into the city.

McMaster University directorate, of Toronto, has appointed a special committee to prepare the site for the new building. A landscape artist will be engaged to prepare plans. The new McMaster is to be on a national scale, with an alternate capacity for a thousand students.

The Colonization Roads Department of Ontario has practically completed its work for the year, and Superintendent W. Bennet is busy completing returns from inspectors in all the northern parts of the province to find out the amount of construction accomplished. Last season the Legislature set aside $428,000 for colonization roads, and while the whole of this sum has not been expended, the Department has placed well over $400,000 in roads during the season.

Misericordia hospital in Edmonton will receive a grant of $240,000 to complete a wing with two hundred beds if the by-law to be submitted by a committee of the city council is approved by the ratepayers.

A large deputation is being organized by the city council of Peterborough and the Boards of Trade from all the municipalities along the Trent Valley Canal route, to impress upon the Government the vital necessity to the whole of eastern and central Ontario of the immediate enlargement and completion of the Trent Valley Canal.

Victoria's building figures for the first ten months of this year show an increase of more than three million dollars over those of the corresponding period in 1911. Up to October of the total permits amounted to $6,564,010, while for the ten months of 1911, they were $3,167,340 or less than half. In all Canada Victoria ranks third in the value of the increase.

The Alberta Town Planning and Housing association, the first provincial organization of its kind in Canada, was recently formed at Edmonton. The objects of this association are to aid municipalities in their improvement and extension to insure a proper development of the town or city on hygienic, convenient and artistic lines, and to secure legislation looking to that end.

Construction work has started on what is to be the biggest store in Montreal, which is being built for W. H. Scroggie, Limited. It will cover the block bounded by St. Catherine, Bleury, St. Edward and St. Alexander streets, containing eight acres of floor space and will have five miles of aisles. The Lyall Construction Company agree to complete the structure by September 1, 1913.

While excavating on Yonge street, Toronto, recently, workmen unearthed a rather unusual water pipe. The pipe itself is only three inches in diameter, but it is imbedded in the centre of 12-inch second growth pine logs. The main was laid in 1835 and both the wood and the pipe are in a remarkable state of preservation. Only a few little pieces are rotted and in some of the pieces of the wood there is still a little sap left.

Maisonneuve, a suburb of Montreal, has been authorized by the Private Bill Committee of the Quebec Legislature to construct a large boulevard, but the committee declined to allow the municipality to build a portion of the boulevard across Montreal. The latter is authorized to construct its own portion, and it was decided that the Maisonneuve building by-laws shall not apply to the building or rebuilding of structures which shall be erected on the boulevard.

A thorough investigation of international waters from the St. Lawrence to the head of Lake Superior is to be carried on during the next year by joint action between the Ontario and United States health authorities. The decision to extend the examination of boundary waters for evidence of pollution is the result of the suggestion made by the International Joint Commission at Washington. An interim report will be made to the commission on November 1, 1913.

The Metal Shingle and Siding Company have amalgamated with the A. B. Ormsby Company, Limited, of Toronto and Winnipeg. The company are in association with the United States Metal Product Company of Long Island, New York, and will erect a large plant in Toronto for the manufacture of the products of the United States Metals concern. They have purchased all the Canadian patents of the American plant, and will add their complete line to those now manufactured by the original company and the A. B. Ormsby Company. The company will have seven plants in all, stationed at Montreal, Preston, Toronto, Winnipeg, Saskatoon, Calgary and Detroit.

Forty-eight million dollars' worth of rolling stock has been ordered this year by the Canadian Pacific Railway, according to a statement issued recently. The new equipment ordered during 1912 includes 467 locomotives, 26,653 box cars, 626 flat cars, 401 coal cars, 300 stock cars, 227 refrigerator cars, 94 first-class sleepers, three compartment cars, 20 observation cars, 25 diners, 57 tourist cars, 117 first-class and suburban cars, 4 motor mountain climbing cars, 138 baggage, mail and express cars.

The Calgary Silicate Pressed Brick Company, Limited (Mr. G. Silvester, managing director), report an excellent season's trade with an increasing demand for sand lime brick. In a recent communication to this journal, Mr. Silvester stated that the firm had just closed an order for 800,000 grey sand lime brick, and that an order just completed was for 250,000 brick. The plant will be busy right through the winter. Mr. Silvester is now in Toronto attending the convention of the Sand Lime Brick Manufacturers.

At Halifax, N.S., the proposed additions to the terminal facilities include the construction of six piers, each 1,250 ft. and 300 ft. wide, which will extend from the present lumber yard of Point Pleasant Park. These piers will furnish accommodations for docking at least thirty additional ships, while a bulkhead loading pier 2,000 feet long is to be provided, at which the ocean liners will land. This latter pier will be equipped with immigration buildings, sheds, and a grain elevator. These terminals will be approached by a double tracked railroad and at the present end of Hollis street, a union passenger station is to be built.

Two hundred thousand dollars will be expended by the University of Alberta in Edmonton to provide the third unit of dormitory buildings, giving a total frontage of 1,600 feet. The board of governors has made application for a permit to erect a structure of 800 feet frontage, to be erected south of the other buildings, each of which has a frontage of 300 feet. Quarters will be provided for 150 students. It is expected to have the new building ready for occupancy early next season. The governors are planning to erect several other buildings next year, and it is officially announced that when the final plans are completed there will be accommodations for fully five thousand students.

Almost a million barrels of cement were imported into Canada from the United States in the five months in which duty remission was granted. Complete figures now available show a total importation of 988,393 barrels, valued at $1,328,937, or $1.34 per barrel. The total consumption in Canada this year was eight million barrels. In 1911, the importations were 449,584 barrels, valued at $1.24 a barrel. The price thus advanced by ten cents. The duty remission was designed to overcome the shortage in the west, and that it has worked out that way is shown by the fact that in the three prairie provinces the imports, in the remission period, were 399,789 barrels as compared with but 4,800 in 1911.

After a conference between the members of the Quebec City Council, the chairman and consulting engineer of the Harbor Commission, and the engineer of the Transcontinental Railway, it has been decided to erect a Union Station at the Palais. For the purpose the city is to give 28 acres of Victoria Park to the railways, to be used as a shunting ground. In exchange for this the Canadian Pacific Railway will give to the city forty acres of land at Hare Point, close by, for a park. The government is also to change the course of the River St. Charles, and in place of a bridge now in use will erect a viaduct for foot passengers and vehicles.

The Union Station is to be used by the Canadian Pacific, Grand Trunk Pacific, and the Canadian Northern.

About 2,500 guests were present at the opening of the dry dock "Duke of Connaught," at Maisonneuve, P.Q., by the Governor-General. The dock has been constructed in England for Canadian Vickers, Limited, and it is proposed to build on the site of thirty acres a shipbuilding plant capable of launching three ocean ships simultaneously. The Duke of Connaught, at the conclusion of his speech, unveiled a bronze tablet bearing his arms, those of the Dominion, the crest of the Harbor Commission, and an inscription setting forth that the dock was dedicated by the Duke as Governor-General to shipping and industry in Canada. The names of the Marine Department officials and those of the Harbor Board were appended.

Among the important contracts completed recently by the Manitoba Bridge & Iron Works, Limited, of Winnipeg, are the Osborne Street bridge, the addition to the N. T. R. shops at Transcona and to the C. N. R. shops at Fort Rouge, the Canadian Bank of Commerce and C. P. R. office building at Edmonton, and the C. P. R. office building at Saskatoon. The principal work upon which they are now engaged comprises the Pantages Theatre at Edmonton, the Canadian Pacific Railway bridges in the western division and an addition to the Canada Cement Company's plant at Exshaw. The company has some 450 men employed. It is hoped to publish a detailed description of the Osborne Street bridge in an early issue of this journal.

Building operations in Winnipeg have suffered to some extent from the weather conditions, though not so seriously as might have been expected. A good proportion of the large works are walled in, and so long as delivery of supplies can be maintained at the required rate the weather will have very little effect. To reach $20,000,000 for this year's building record, it will be necessary for permits for $750,000 to be issued before the end of the year. During the months of November and December last year permits aggregating over $600,000 were issued, so that it is considered probable that even with nothing but small buildings in sight, the permits will amount to that figure, while they are already $1,500,000 in excess of the total for last year, which was $17,716,750.

Canadian Railroad Development

The Canadian Pacific Railway is planning to construct new car shops in West Toronto, at a cost of $22,000.

At the present rate of progress the Mount Royal Tunnel of the Canadian Northern Railway at Montreal will be pierced in three hundred days.

The railway construction work to be carried on in Ontario this winter is to exceed that of any winter railway construction yet seen in this province. Many thousands of men will be employed both by the Canadian Northern Railway and Canadian Pacific Railway.

The Mackenzie & Mann interests are reported to have purchased from Dr. Daniel Stewart and his partners the charter of the London & Northwestern Railway, which includes the right to develop power at Rock Glen and to build railways from Parkhill, Strathroy, Watford and other towns west of London.

A report received recently from Regina states that steel laying on the Grand Trunk Pacific from that city has now reached a point within half a mile of Moose Jaw and will be completed shortly. Nine thousand yards of gravel must be moved before getting a service into the last named point and it is improbable that anything will be done to this end before spring. Ninety miles of the branch south from Regina have also been completed.

The Temiskaming and Northern Ontario Railway Commission has handed to Hon. A. J. Matheson, Provincial Treasurer, a cheque for $510,000 on account of earnings for the past financial year. The sum paid over is $10,000 higher than the estimate made by the Privincial Treasurer to the Legislature last session.

The engineers of the Canadian Northern Railway recently received permission to locate the last link of the Montreal-Port Arthur line. Lines will be built through sections of the province five miles on each side of the town of Pembroke, and plans are now being drawn for the approval of the Railway Commission.

It is rumored that the Canadian Pacific Railway Company is contemplating the construction of a line connecting the New Brunswick Southern Railroad and the Canadian Pacific main line, giving the former road direct access to the Union Station in St. John, N.B. New repair shops and car construction works are said to be included in the improvements.

Part of the programme of the Canadian Pacific Railway includes the double tracking of the lines from Montreal to Fort William to Brandon and work is proceeding with the new lake shore line from Glen Tay to Toronto, making a double track between the latter city and Montreal. The company are completing the double tracking of several portions of the line on the north shore of Lake Superior. The company have in hand the work of double tracking from Montreal Junction to St. Johns, Que., which is to be extended to Farnham, and double tracking has been laid between Place Viger Station and St. Therese..

The Tuec Air Cleaning System

After careful investigation engineers and architects have come to realize that it is air that does cleaning and not vacuum, and that consequently the machine or system that moves the greatest number of cubic feet of air per minute for the horse power expended is the most efficient.

The Tuec Air Cleaners are designed to displace an enormous amount of air per energy consumed, whether the cleaner is to be used for household, apartment or office building cleaning, and the system is so simple in all particulars that it appeals to anyone interested in vacuum cleaning. The demand for the Tuec machine is very extensive and the United Electric Company, of Canton, Ohio, manufacturers of this cleaner, now have the largest factory in the world devoted exclusively to the manufacture of stationary air cleaning systems.

The air displacer, a powerful centrifugal fan, is attached to the rotor shaft of the motor (this shaft being vertical) and revolves in a horizontal plane. The only bearing surfaces in the whole machine are made of twoball ("Sketko") bearings and accordingly the friction loss is particularly low. One of the smaller units was run for one hundred days continuously, under seal, thus preventing inspection and oiling. At the end of this period the ball bearings (the only wearing surfaces) were carefully calipered and found to have sustained no measurable wear whatever. This period of operation equals 23 years' service at two hours per week, the time necessary to keep an ordinary home perfectly clean with the Tuec.

The machine separates the dirt from the air that carries it by gravity only, thus eliminating the unsanitary and troublesome cloth sack, which sack of course decreases the air supply to a continuously increasing degree as it becomes clogged with dust particles.

The hose and tools are extra large, but light and strong, and the piping specified with the system is 2½ inches in diameter. This size pipe prevents clogging troubles with matches (match being 2¼ in. long) and permits of a big volume of air being delivered at the tool with very little loss. The advantage of the large pipe can readily be realized when one considers that one 2½ in. pipe equals 1.7 2-in. pipes, 3.3 1½-in. pipes and 11.4 1-in. pipes in carrying capacity.

The Tuec system is designed so as to give 70 to 90 cubic feet (120,960 to 155,520 cubic inches) per minute at the cleaning tool. This volume is so great that it can lift and take into the big tools, stones, pieces of wood, matches, dust, etc., while the vacuum is so low that it cannot hurt the finest fabric or carpet.

In the largest vacuum-cleaning test ever held, the Tuec system scored 97.6 per cent. efficiency out of a possible 100 per cent., and the nearest competitor scored 87.4 per cent., the test being conducted by such eminent engineers as Mr. Howard E. Coffin, of the Hudson Motor Car Company, and Dean Allen, of the University of Michigan Engineering Department.

Up to November last 4,110 Tuec installations had been made. This is a remarkable record as the company has been in the field not quite three years. In that period it is stated that sales have increased to such an extent that two Tuecs are sold to one of all competitors combined at the present time.

The Canadian representatives for the Tuec System are: The Tuec Company of Calgary, 812 First Street West, Calgary, Alta.; Mr. R. T. Wood, 419 Portage Avenue, Winnipeg, Man.; and Mr. James J. Martindale, 112 Mail Building, Toronto, Ont.

Publications and Catalogues

Cement Specifications, by Jerome Cochran; publishers, D. Van Nostrand Company, 25 Park Place, New York City; price, $1. This book will be found particularly useful by the engineering student desirous of studying the methods employed in drawing up cement specifications. In the specifications presented, great care has been taken in the matter of classification and arrangement, and the value of the book for convenient practical use and ready reference is enhanced by sub-division into parts, sections and paragraphs.

Features of the Brownhoist Buckets and Tubs are described in a 55-page booklet, "Catalogue E," issued by the Brown Hoisting Machinery Company, Cleveland, Ohio. Detailed descriptions are given of certain types of grab and drag-line buckets manufactured by the company, and this information is supplemented by tables of dimensions and capacities. Numerous photographs are given showing the application of these buckets.

From the De Laval Steam Turbine Company, Trenton, N.J., there has come a copy of a 117-page catalogue descriptive of the De Laval multi-stage turbine. The makers claim that they can furnish a tppe of turbine for any given capacity and steam conditions. Various types, with the peculiar advantages of each, are described in the catalogue.

Catalogue No. 7 of the Toledo Wheelbarrow Company, Toledo, Ohio, contains complete illustrated descriptions of the company's various well known lines. The "bullfrog" trademark adopted by the firm has come to be regarded as a synonym for efficiency and durability in the line of contractors' barrows. One of the features of the publication is the additional line of drag scrapers. Full constructional details are given in the case of both the wheelbarrows and the scrapers, furnishing proof of the ability of the company's products to withstand severe usage. Copies of the catalogue will be forwarded upon application. The company has a large stock of raw and finished material always on hand and has every facility for prompt delivery.

Trident meters, manufactured by the Neptune Meter Company, of New York, are described and illustrated in an attractive publication recently to hand. The excellence of the manufacture of Trident meters is attested by the fact that upwards of 900,000 have now been marketed. Trident meters are made in several types to meet varying requirements. Their strong points are accuracy and the minimum of attention and repair.

The Sterling destructor—an English high temperature furnace for the disposal of municipal refuse and industrial waste—is described in a publication issued by the Griscom-Russell Company, 90 West Street, New York, who control the American rights of the Sterling destructor for this continent. The data and illustrations given are mainly from British sources, inasmuch as the disposal of municipal waste has been carried to its highest point of economic development in the British Isles. The Sterling destructor is well adapted for use on this continent and municipalities and engineers will be well advised to look into its merits. The Griscom-Russell Company inform us that they have now under construction three plants of the Sterling design and that they are receiving numerous enquiries.

The Standard Underground Cable Company of Canada, Limited, Hamilton, Ont., are distributing an informative booklet descriptive of Sterling rubber insulated wire and cable. Sterling wire has withstood the test of twenty years' exacting service. It has as its foundation the best obtainable grade of copper bars. The copper conductor is first covered with a uniform protective coating of tin and then insulated to the required thickness with a carefully selected and compounded rubber. The manufacturing processes of this firm are the result of more than thirty years' successful experience in the manufacture of electric wires and cables and over twenty years' experience in making rubber covered wire. Sterling installations are claimed to be un-

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The announcement made in this issue by the Abram Cement Tool Company of Windsor, Ont., cannot fail to be of special interest to sidewalk contractors. This company manufactures a compete line of sidewalk finishing tools, consisting of trowels, jointers and edgers. These tools are unique in that they are equipped with a mechanical device which tilts or rocks the tools when in action just as the finisher does by hand. The operator stands erect at the side of the walk, the tools being equipped with long handles. Great claims are made for the economy and efficiency of the Abram lines. The company's offer and the guarantee under which the tools are sold speak for theuselves.

The John McDougall Caledonian Iron Works Company, Limited, of Montreal, have been appointed exclusive agents for Canada for the high speed steam engines built by Browett, Lindley & Company, Limited, of Manchester, England. The "Browett-Lindley" enclosed, forced lubrication, double acting engines are simple in construction, and, owing to the efficient system of lubrication and perfect balance of the moving parts, run silently and steadily under all conditions of load. The company has made a specialty of building engines for driving dynamos since the earliest days of the electrical industry. The "Browett-Lindley" is in use in the largest electric light and tramway stations, as well as in the most important collieries, steel and iron works, cotton and paper mills, etc., in England and has earned an enviable reputation for economy and high efficiency.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Ashcroft, B.C.

Sewage system, cost $25,000, is under consideration of the town council.

Assiniboia, Man.

Gravelling road to cost $17,000. Portage avenue; planned by municipality. Sec. treas., Frank Ness, Kirkfield Park P. O. By-law to be submitted Dec. 17th.

Edmonton, Alta.

Asphalt pavements. Mayor, Geo. Armstrong. Engineer, A. J. Latornell. City Clerk Cox will receive tenders until Dec. 10th for paving on 46 streets, approximate area 511,533 sq. yds.; approximate cost $1,734,786.

Kingsville. Ont.

Addition to water mains is under contemplation of the town council. Further information from clerk, George Pearse.

New Westminster, B.C.

Waterworks extension, cost $100,000, planned by the city council. A by-law will be submitted in January.

North Bay, Ont.

Waterworks extension. Tenders received by Commissioner of Works, T. N. Colgan, until Dec. 7th, for laying steel intake pipe and cast iron pipe with valves. Plans, specifications, etc., at his office.

Ottawa. Ont.

Castings. Tenders received by Waterworks Commission, City Hall, until Dec 10th for 31 castings for "Booster Plant." Specifications at office of City Engineer, Mr N J. Ker.

Rosser, Man.

Construction of 18-ft roads to cost $110,000, is under contemplation of the town council Clerk, W. H. Beachell. By-law will be submitted shortly.

Summerland, B.C.

Extension to water and electric lighting systems, cost $150,000. Engineer, Mr. Latimer By-laws were passed recently, water, $100,000; light, $50,000.

Shoal Lake, Man.

Waterworks. Supply and installation of waterworks system throughout the Shoal Lake Hospital. Specifications, etc with Mrs James D McLean, Shoal Lake, who will also receive tenders.

Toronto, Ont.

Asphalt pavements, cost $16,119, with concrete gutters, on Prust ave., Bathurst and Dora streets, have been recommended by the Board of Control Mayor, H C Hocken Engineer, R C Harris.

Concrete walks, cost $1,923, recommended by Board of Control 6-ft concrete walk on Queen E. from Kingston Road 5-ft concrete walk on VanHorne street west to Dufferin. Mayor, H. C. Hocken, Engineer, R. C. Harris.

Brick block pavement to cost $13,628 has been recommended. 24-ft. pavement on 4-in. concrete foundation on Weston road and Prust avenue. 20-ft. pavement on lane west of York. Mayor, H. C. Hocken. City Engineer, R. C. Harris.

Cement concrete sidewalks to cost $6,392; Geary, Astley and Pacific avenue, Cypress street, Davenport and Weston road. Above work has been recommended by the Board of Control. Mayor, H. C. Hocken. Commissioner of Works, R. C. Harris.

Winnipeg, Man.

Trunk sewers are under contemplation for St. Mary's and St. Anne's Rds. Rural Municipality of St. Vital. Sec. treas., G. J. Charette.

Valves required for waterworks system. Specifications at office of engineer. Tenders received by secretary until Dec. 9th. Board of Control. Sec., M. Peterson. Engineer, H. N. Ruttan, 223 James avenue.

Local improvements under contemplation. Plank walks on various streets, $2,872; cedar block pavements on lane between Grosvenor and Yale avenue, Stafford and Harrow street $1,818; asphalt No. 2 pavement on lane between Canora and Chestnut streets, Wolsely and Westminster avenue, $4,530; asphalt No. 1 pavements on line between market and Jane street and King and Princess streets $2,332. On lane between Elgin and Ross, Princess and C.P.R. spur, $883; granolithic walks on various streets $3,285; sewer on Bannerman, Manitoba, Atlantic, Sinclair, Union, Clifton, Richard, Strathcona, Saskatchewan, Empress, Sargent and St. James streets, $207,534.

150 6-in. hydrants for domestic water works system required. Specifications at office of engineer H. N. Ruttan, 223 James avenue. Tenders received by secretary until Dec. 9th.

CONTRACTS AWARDED

Brandon, Man.

Pumping station to cost $30,000 Builder, Thomas Chambers, 123 17th street General contractor, R F. Speakman 2 sty., pressed brick, stone foundation.

Hamilton, Ont.

Sewers to cost $6,578 on Britannia ave., Auburn street, Cumberland avenue, Stipe's lane. Mayor, Geo H Lees. Engineer, A F Macallum Work to be done by day labor under supervision of engineer

Sewers to cost $1,609.01 on Mars ave., Fairleigh Crescent, Wood and Bay St. S. General contractor, Thomas Lawson, 209 Garth street Samuel Cheeseman, 18 Burris street, sewer on Homewood ave Mayor, Geo H Lees Engineer, A F Macallum

Water mains will be laid on Gertrude street and into premises of the Boston Insulated Wire & Cable Co., Shaw street. Work done by day labor under supervision of engineer. Mayor, Geo. H. Lees. Engineer, A. F. Macallum.

Sewers, Mayor, Geo. H. Lees, Engineer, A. F. Macallum. General contractor, J. D. Armstrong, 48 Burris St. Construction of 80 private drain connections on Chedoke avenue.

Toronto, Ont.

Tile pipe sewers. Mayor, H. C. Hocken. Commissioner of Works, R. C. Harris. Contract awarded to W. J. Haynes, 401 Dupont street. 2 sec. on Davenport road $10,936. J. H. McKnight Construction Co., 152 Bay street, laying of 30-in. cast iron pipe on Eastern avenue. National Contracting Co., 155 Lee avenue, sewer outlet $5,548. Commissioners of Works; lane 1st west of Dnundas street $600; lane 1st north of Wilton avenue $520; Arlington avenue $590.

Wetaskiwin, Alta.

Sewage disposal plant. General contractors, the Jno. Galt Engineering Co., Winnipeg and Calgary.

Railroads, Bridges and Wharves

Barkerville, B.C.

The Cariboo, Barkerville & Willow River Railway Co. will apply for permission to build railway from Eagle Lake to Barkerville, following the Willow River.

Cap De La Madeliene, Que.

Wharf contemplated by Dom Govt., Dept. Public Works. Sec., R. C Desrochers, Ottawa. Tenders to be called shortly

Desaulniers, Ont.

C. N. O Ry. Co.'s location of station at Desaulniers, Twp of Gibbons, has been approved

East River. N.S.

Lock, dam, etc., contemplated by Dom Govt., Dept. Public Works Sec., R C Desrochers, Ottawa Tenders to be called shortly for construction of lock, dam, sluices, piers, excavating raceway and channel.

Glenbow, Alta.

C P R Co have been authorized to construct spur for The Brick & Supplies Ltd

Halifax, N. S.

Piers and terminal station planned by Dartmouth Ferry Commission, Dartmouth Two piers 200 ft long, pile construction, to cost from $20,000 to $25,000 also new station house

Marie, King's County, P.E.I.

Spur, siding and bridges Dom Govt., Dept Railways & Canals, Minister Hon Frank Cochrane Ottawa Engineer H J McGrath, Moncton, N B preparing [illegible] of 900 ft to P. E. I. Railway, also siding, and a bridge from which mussel mud can be precipitated from loaded sleighs to car below, to facilitate conveyance of same as a fertilizer to various parts of the province by rail.

Moncton, N.B.
Addition to freight car repair shop by Dom. Govt. Dept. of Railways and Canals. Tenders received by Sec., L. K. Jones, Ottawa, until Dec. 16th. Plans and specifications at office of Dept. at Ottawa and office of Engineer of Maintenance, Moncton, N.B.

Montreal. Que.
Bridge. C. N. Q. Ry. Co. have been authorized to construct across Sanguinet street by means of overhead structure.

Electric road planned for Montreal & Southern Counties Rly. Co., head office 707 Can. Express Bldg., Montreal. General manager, W. B. Powell. Company has applied for right of way from Montreal to Granby Village. A committee has been appointed to look into the matter.

Ottawa, Ont.
Railway construction. Application will be made at next session of Parliament to amend act incorporating the Imperial Traction Co. authorizing the company to extend its already authorized line, and to lay out, construct, equip and operate a line or lines of railway, telephone and telegraph, in the Province of Ontario, from a point at or near Smithville, in County of Lincoln, to Bridgeburg, in County of Welland, and from a point out of Hamilton in county of Wentworth to point at or near the city of Toronto. Solicitors for company, Harding & Owens, Gordon Block, Stratford, Ont.

Owen Sound, Ont.
C. P. Ry. Co. have been authorized to construct spur for the Superior Match Co., Ltd

Sumas Junction, B.C.
Canadian Pacific Railway Company's location of station at Sumas Junction has been approved.

St. Catharines, Ont.
Niagara, St. Catharines & Toronto Ry. plan extension of line from St. Catharines to Niagara-on-the-Lake. Work on construction to start at once.

Streetsville, Ont.
Spur and bridge planned for Streetsville Brick Co. Engineer in charge, F. [illegible] & M. Stillwaugh. Spur ½ mile long, from main line of C. P. R. at station to brickworks, bridge 1 span 20 ft. long, timber substructure.

Toronto. Ont.
C. P. Ry. Co. have been authorized to construct spur for the Hunter Structural Steel Co.

Vancouver. B.C.
Ferry, cost $135,000, contemplated by City Council. Clerk, Wm. McQueen. By-law will be submitted on December 7.

Bridge (Second Narrows) planned for The Burrard Inlet Tunnel & Bridge Co., 142 Hastings W. Architects, Cleveland & Cameron, Rogers Bldg. Plans have been forwarded to Ottawa. Sir John Barry has been instructed to prepare specifications. Centre span 225 ft.

Winnipeg, Man.
Bridge. Board of Control. Sec., M. Peterson. Council have voted for city engineer, H. N. Ruttan, 223 James ave., to prepare estimate on cost of concrete bridge instead of a steel one as formerly contemplated.

Waldheim, Sask.
Canadian Northern Railway Company have been directed to construct a third class station at Waldheim.

CONTRACTS AWARDED

Broughton, N.S.
Railway construction planned for Cape Breton Coal & Railway Co. President, Horace Mayhew. Engineer in charge, Daniel Ferguson, Glace Bay, N.S. General contractors, Lynch, Packham & Gorham, c/o company, Broughton.

Medicine Hat, Alta.
Bridge, cost $9,500. Clerk, H. Baker. Engineers, the Canadian Bridge Company. A factory is to be erected on the east side of Finlay bridge. An 8-in. water main will be carried under the bridge.

Seymour Arm, B.C.
Pile bent wharf, cost $5,850. Dominion Government, Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. General contractors, Messrs. Maurice Gillis, Dove & Tansley, Seymour Arm.

Public Building, Churches, Schools, etc.

Berlin, Ont.
City Hall. Clerk, Jos. McCartney. Town Council has secured option on property on King street for site for new City Hall. By-law will probably be submitted to ratepayers in near future.

Bridgeburg, Ont.
Church to cost $13,000 to be erected for Central Avenue Methodist Congregation. Chairman Committee, M. House. Old building is being razed. Plans in progress.

Golden, B.C.
Farm buildings, cost $40,000, for Canadian Pacific Railway, Dept. of Natural Resources, Calgary. 4 roomed houses, barns, 14 x 25. 15 sets of buildings to be constructed. The 5 sets to be erected at Edelweiss will have exterior covered with slabs to give log facing. Tenders called.

Fallowfield, Ont.
Alterations and renovations to R. C. Church to cost $6,000. Architect, C. P. Meredith, 126 Sparks street. Hot water heating, septic tank, plumbing. Plans being prepared.

Hamilton, Ont.
Alterations to building planned for Knights of Columbus Home Association. Address Hugh Hennessey, King street E. Nothing to be done on this for at least one year.

Fire station (East End) to cost $25,000 planned by City Council. Mayor, Geo. H. Lees. Engineer, A. F. Macallum. Ratepayers will vote on by-law in January. Equipment required.

Custom House on John street is under contemplation of the Dom. Govt., Dept. Public Works. Sec., R. C. Desrochers, Ottawa.

Murray Bay, Que.
Public building planned. Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders to be called shortly.

Quesnel, B.C.
Court House planned by Dominion Government, Dept. of Public Works. Plans and specifications at office of engineer J. E. Griffiths, who will receive tenders until December 9th.

St. Joseph, N.B.
Extension to St. Joseph's College. Supt., Rev. B. LeCavalier. Architect, R. A. Frechet, 39 D'Aguillon street, Quebec, Que. Tenders received by architect until Dec. 31st for construction of "L" to present building. Plans and specifications at office of architect and at College, c/o Rev. Superior.

Toronto. Ont.
Vestry planned for St. Alban's Cathedral Board. Address Secy. of Women's League, c/o Bishop J. F. Sweeny, 112 Howland avenue. Brick construction.

Victoria, B.C.
Schools. Tenders will be called by architect, Rouss Collin, Hibben Bldg., for erection of three schools and one 8 roomed school on Boleskin Road.

Vancouver, B.C.
Tenders received until Jan. 7th for construction of a wooden double dwelling at Cape Beale on West Coast of Vancouver Island. Plans, &c., at Dept. Marine & Fisheries, Ottawa and Victoria, Post Offices Vancouver, Alberni, Banfield and New Westminster. A. Johnston, Deputy Minister of Marine & Fisheries, Ottawa, Ont.

Waskada. Man.
Rink to cost $4,000 planned for The Waskada Skating & Curling Rink Co., Ltd. Work will commence this fall.

Weedon, Que.
Public building planned by Dom. Govt. Dept. Public Works. Sec., R. C. Desrochers, Ottawa. Tenders to be called shortly.

Winnipeg, Man.
Drill hall to cost $75,000, Machray and Mountain avenue. Dom. Govt., Dept. Public Works. Sec., R. C. Desrochers, Ottawa. Site 82 x 85. Plans in progress.

CONTRACTS AWARDED

Camrose, Alta.
2 temporary schools for classes in manual training and domestic science for Public School Board. General contractors, Thomas Shea and George Hardy.

Charlottetown, P.E.I
Vacuum steam heating plant to cost $4,500. General contractors, The Bruce, Stewart Co., Ltd. For installing a modern low pressure vacuum steam heating system in the Provincial Government Building. L. B. McMillan, Sec. Dept. Public Works.

Fairbank, Ont.
Church for Baptist Congregation. Interested, Rev. Jno. McIntosh, 440 St. Clarens avenue, Toronto. General contractor, H. Davis, 986 St. Clarens avenue, Toronto. Cedar post foundation, frame construction.

Guelph, Ont.
Barracks for Salvation Army, Headquarters Toronto. Architect, Adj. Miller, 20 Albert street, Toronto. General

contractors, Cowan & Walker, London Road. Heating and plumbing and electric work, Grinyear & Co., Wilson street. Brick construction.

Ladysmith, B.C.

High School to cost $7,047, Market Sq. General contractors, Smith & Adams, 731 Vancouver street, Victoria, B.C. 2 rooms. General contract includes hot water heating.

Penticton, B.C.

School to cost $50,000. Main and Jermyn streets. Architects, Bell & Constant Vernon. General contractor, T. E. Crowell, Vernon. Heating, J. B. Wallace, Vernon . Electric, Penticton Electric Co. Plumbing, J. Sutherland. Interior fitting contract not let yet. 2-sty. and basement. 78 x 108, cement foundation, brick construction.

Trenton, Ont.

Theatre (Redgeway street). Owner and builder, R. W. Weller. 1-storey, stone and cement foundation, brick construction. Seating capacity about 1000.

Business Buildings and Industrial Plants

Alexandria, Ont.

Extension to plant planned for The Schell Foundry & Machine Co., Ltd. Pres., J. T. Schell. By-law has been passed gauranteeing the bonds of the above company. Additional buildings to be erected.

Brandon, Man.

Store to cost $4,000 for D. Crystall, 119-3rd street. Architect, Thos. Chambers, 123-17th street. 2-sty., 20 x 36, pressed brick foundation, stone construction. Plans ready.

Calgary, Alta.

Greenhouse to cost $4,000 (Mission), for J. Emery, 1811 4th street W. 1-sty., 25 x 175, frame construction. Plans ready.

Stores and rooms to cost $12,000, Ogden, for Waterman & Adams. Architect, H. Moore, 409 Travis Block. 2-sty., 75 x 60, cement foundation, brick construction. Plans ready. Excavating started.

Warehouse to cost $4,000, 11th avenue S.W., for Campbell & Griffin. Architects, Rutly & Weare, Underwood Blk. 5-sty., 50 x 130, brick foundation, brick construction. Plans drawn.

Offices and stores to cost $20,000, 8th avenue E., for Max Cohen, 421 5th ave E. Architect, J. Harrison, Box 1243. 2-sty., 50 x 95, cement and brick foundation, brick construction. Plans ready.

Stores and rooms to cost $9,000, Cecpear for Mrs. C. Adams. Architect, H. Moore, 409 Travis Blk. 2-sty., 50 x 75, cement foundation, brick construction. Plans ready.

Danville, Que.

Dry kiln planned for Danville Chair & Specialty Co., Ltd. Sec., J. E. Guilmotte. To be fitted with latest improvements. 60 x 16, brick construction.

Esquimalt, B.C.

Sawmill under contemplation for the Canadian Puget Sound Lumber Company, 2120 Store street, Victoria. Sawmill will be electrically driven. Plans will be prepared.

Estevan, Sask.

Brick plant. Geo. Barr, Gladstone, Man., will erect plant for manufacture of sand bricks.

Galt, Ont.

Factory (addition) to cost $15,000 for The Galt Shoe Mfg. Co. Architect, William Scott, Chapman street. 4-sty., brick construction. Plans in progress.

Grand Lake District, N.B.

Factory. The Standard Drain Pipe Co., St. James street, St. Johns, Que., plan to establish new plant in the Grand Lake District.

Hamilton, Ont.

Gas and coke plant to cost $4,000,000 planned by a syndicate. Represented by J. G. Gould, c/o Nesbitt & Gould, Canada Life Bldg., and The United Coke & Gas Co., New York. Work will not be proceeded with until next spring.

Addition to Simcoe Hotel, King St. E. for Dennis Biggar, K.C., Canada Life Bldg. Architect, A. W. Peene, 2 King street W., is preparing plans. Work to be done next spring.

Hull, Ont.

A Syndicate has purchased 300 acres and will build plant for manufacture of bricks and pottery. Interested, Dr. A. T. Shillington, 281 Gilmour street, A. A. Taillon, 104 Sparks street, H. W. Chamberlain, 191 Bank street.

Kenora, Ont.

Machine shop, cost $25,000, planned for Thurber Syndicate. Secretary, Jas. Weidman. Machines for the Thurber process of gold extraction will be manufactured. Plant will consist of a pattern, casting and machine shop.

Lindsay, Ont.

Auto garage for Madison Williams & Son, Agents for Ford Motor Co. Three storeys, 60 x 35, stone foundation, steel, concrete and concrete block construction. Tenders received by owner.

Lambeth, Ont.

Enlarging brick plant for Robinson & Kelly under consideration. Company will manufacture cement brick, blocks, and tile. Cement machinery required.

London, Ont.

The Dom. Chicle Co., rear 186 King street; manager, G. Bucke, have bought the old Reid Building and will double its plant. Electric lighting and office equipment, gum rolls, chicle machinery required.

Extension to factory planned for The Holeproof Hosiery Co. of Canada, 186 King street. Electric equipment, asbestos piping and new machinery required.

Magog, Que.

Foundry is planned for Magog Foundry Company, Ltd., which has been incorporated with capital of $19,500.

Ottawa, Ont.

Stable to cost $3,000, Grosvenor street, for A. A. Fournier, 200 McLaren. Architect, C. J. Burritt, Sparks Chambers. 38 x 28, brick veneer construction, cement foundation. Plans in progress.

St. John, N.B.

Bank building, Market Square, for Bank of British North America. Architects, Barott, Blackader & Webster, 410 New Birks Bldg., Montreal, Que. Tenders will be called after 15th of December. Stone and brick construction, stone foundation.

St. Johns, Que.

Ice house will be erected for David Morisette & Chas. Dube. Machinery required. frame construction. Plans in progress.

Storage warehouse planned for St. John Dock & Warehouse Co., Ltd., c/o Geo. McA. Blizzard, Prince William St. 140 x 100, fireproof construction.

Streetsville, Ont.

Brick plant planned for Streetsville Brick Works Co. Cement foundation, frame construction. Work will start shortly.

Swift Current, Sask.

Cold storage plant planned for The Calgary Brewing & Malting Co., Calgary, Alta. Work will start as soon as possible on site recently purchased.

Flour mill to be built for The Ford Milling Co. Pres., Mr. Ford. Capacity, 1,000 bbls. per day. Plans prepared.

Toronto, Ont.

Store and residence to cost $15,000, Gilmore and Dundas, for A. Rappaport, Dundas & Gilmore avenue. 3-sty., 80 x 30, stone foundation, brick and cut stone construction. Plans drawn.

Factory contemplated, King and Dufferin streets, for A. B. Ormsby, Ltd., Queen and George streets. Company is negotiating with city to purchase site. Building to be erected in spring.

Storehouse to cost $5,000, Vine and Keele street, for Gibson McCormick & Irwin, Vine avenue. Architects, Ellis & Connery, Manning Chambers. 1-sty., brick construction, cement foundation. Plans drawn.

Factory planned for The Forsyth Pulverizer Co., Ltd. (Walter F. Gouinlock, 83 Isabella street). Company organized with capital of $250,000. Will erect plant to manufacture rock crushing and mining machinery.

Factory, Adelaide street, for Saunders, Lorie & Co., c/o Solomon Lorie, 48 Clarendon avenue. Architects, Burke, Horwood & White, 28 Toronto street. 4-sty., brick foundation and structural steel construction. Plans in progress.

Factory to cost $10,000, Ashbridge's Bay, for G. E. Lindsay, 2 College street. Reinforced concrete and brick construction. Plans in progress.

Addition to Toilet Laundry Co.'s building, 44 Bathurst street. Architect, J. M. Cowan, 65 Adelaide E. 2-sty., cement foundation, brick construction, concrete floors. Plans drawn.

Vancouver, B.C.

Mill, cost $25,000, False Creek, for the Pacific Box Co., 324 Prior street. President, R. W. Sharpe. A site has been purchased, on which company will erect plant having three times the capacity of present one. Box making machinery will be required.

Automobile factory planned for The Commercial Cars Co., Ltd., Luton, Bedfordshire, England. Work will probably start next spring.

Victoria, B.C.

Compressed fuel factory, cost $7,000. J. Leeton Gonnason & Co., Ltd., Orchard

(Continued on page 75)

Tenders and For Sale Department

Debentures for Sale

Tenders will be received for the sale of Debentures of the Town of Alliston to the amount of $7,000, for waterworks improvements and extensions, bearing interest at the rate of five per cent, repayable in 20 annual payments for principal and interest from the first day of December, 1912. Tenders will be received up to and including the 10th day of December, 1912, and to be marked "Tenders for Debentures."

WM. LOCKHART, Clerk,
Alliston, Ont.

Alliston, Nov. 19, 1912 49-6

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

CITY OF EDMONTON

Engineering Department
1913

Sealed tenders addressed to the undersigned, and endorsed "Tenders for Paving, 1913," will be received at the office of the City Commissioners, Edmonton, Alberta, until 12 o'clock noon on December 10th, 1912, for approximately [illegible] yards of Asphalt and Bitulithic Pavement.

Plans, specifications and all information may be obtained at the office of the City Engineer, or plans and specifications are on file at the office of the Contract Record & Engineering Review, and the Canadian Engineer, Toronto.

Companies wishing to tender on Asphaltic concrete pavement submit their own specification, [illegible].

A deposit fee of Fifteen Dollars ($15) is required when plans and specifications are taken away. This fee will be refunded, provided that the plans and specifications are returned within [illegible] days after closing of tender.

An accepted cheque for the amount of Five Thousand Dollars ($5,000) must accompany each bid.

The lowest or any tender not necessarily accepted.

CITY COMMISSIONERS,

Office of the City Commissioners,
Edmonton, Alta., Nov. 6, 1912 47-49-3

CITY OF REGINA

Tenders for
Power House, Laundry and Refrigerating Plant
at Regina General Hospital

Sealed tenders, endorsed "Tender for Construction of Power House, Laundry and Refrigerating Plant, Regina General Hospital," and addressed to the City Commissioners, Regina, will be received until 12 o'clock noon, **Saturday, December 14, 1912.**

Full particulars may be obtained upon application to Wenger & Cockburn, Room 208, Aldon Block, 12th avenue, Regina.

Each tender must be accompanied by an accepted cheque for $2,500 made payable to the order of the City of Regina, which will be forfeited if the tenderer fails to execute the contract and bond when requested to do so.

The deposits of the unsuccessful tenderers will be returned when the contract is signed.

A deposit of $10 must be made with the application for the plans, as a guarantee of their return.

Proposals must be upon form of tender to be supplied upon application and must be in accordance with the provisions of the specifications.

Plans may be seen on file at the office of the Builders' Exchange, Winnipeg, and the Consulting Engineers, Regina.

The lowest or any tender not necessarily accepted."

L. A. THORNTON,
48-49-12 City Commissioner.

Sealed tenders addressed to the undersigned, and endorsed "Tender for Machinery for 3½-Yard Dipper Dredge," will be received at this office until 4 p.m. on **Monday, December 30, 1912,** for the construction of machinery for a 3½-yard Dipper Dredge.

Plans, specifications and form of contract can be seen and forms of tender obtained at this Department and at the offices of T. H. Schwitzer, Esq., Mech. Superintendent, Birks Building, Ottawa, Ont.; A. E. Dubuc, Esq., District Engineer, Merchants' Bank Building, Montreal, Que., and J. G. Sing, Esq., District Engineer, Confederation Life Building, Toronto, Ont.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residenie of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 2, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—31360. 49-50-17

Intercolonial Railway

TENDER

Sealed tenders, addressed to the undersigned, and marked on the outside "Tender for Freight Car Repair Shop, Moncton," will be received up to and including **Monday, December 16, 1912,** for the construction of an addition to the Freight Car Repair Shop at Moncton, N.B.

Plans and specifications may be seen at the office of the Assistant Deputy Minister and Secretary of the Department of Railways and Canals, Ottawa, and at the office of the Engineer of Maintenance, Moncton, N.B., at which places forms of tender may be obtained.

All the conditions of the specification must be complied with.

L. K. JONES,
Assistant Deputy Minister & Secretary,
Department Railways & Canals, Ottawa, Ont.
Ottawa, Ont.
November 21st, 1912. 49-50-14

Tenders Wanted

Tenders will be received by the undersigned up to **Saturday night, December 7th,** as follows:—

For laying 650 ft. of 16-in. Steel Intake Pipe in Trout Lake, with the necessary crib for elbow at outer end and placing five flexible joints in the pipe line.

Laying about 50 ft. of 12-in. Cast Iron Pipe with necessary bends and placing two valves and connecting to pump.

All pipe, lead, and special castings to be supplied by the Corporation on board cars at North Bay.

Tenderers to state time required to complete the work after material has been supplied. A marked cheque for $100 to accompany tenders.

Plans and specifications may be seen at the office of the Commissioner of Works, North Bay.

The lowest or any tender not necessarily accepted.

T. N. COLGAN,
Commissioner of Works.

North Bay, Nov. 23, 1912. 48-49-11

CITY OF LONDON

Tenders for Supply of Garbage Carts

Sealed proposals addressed to the "Chairman and Members, No. 2 Committee," will be received at the office of the City Clerk until 5 p.m. on **Thursday, December 12th, 1912,** for the supply of rear dump garbage carts.

Each bidder shall name a lump sum for each cart and make his tender on the form furnished by the City Engineer.

Specifications covering the above mentioned work can be obtained at the office of the City Engineer.

Contractors to enclose a marked cheque for Ten Per Cent. (10 p.c.) of the amount of their bids.

The City reserves the right to reject any or all bids and to accept any bid.

W. E. ROBINSON,
Chairman No. 2 Committee.
H. A. BRAZIER,
49-15 City Engineer.

Yellow Pine Timber

We have on hand in London, three car-loads of Yellow Pine Timbers, 8 x 14 to 12 x 14, 12 x 24 ft. long. Prompt shipment can be made. For further particulars apply to the London Lumber Co., London, Ont. 48-49-9

For Sale

Good as new, two Tifft Sons & Co. engines, No. 1 and No. 2, Otis Tubular, open tank heater, plunger pump. Duplex Clayton air compressor, steam driven; Crocker Wheeler direct dynamo; marble switchboard. The Lantz Company, 861 Main Street, Buffalo, N.Y. 49-16

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. 11-t.f.

Wanted

Locomotive crane or travelling derrick 35 to 50 foot boom. Must be in good condition. York Sand & Gravel, Limited, East Toronto, Ont. 47-50-99

Practical engineer and draughtsman, English, age 42, with life experience in the design and manufacturing of locomotive and derrick cranes, and other contractors' plant, seeks situation. Apply to Box 653, Contract Record, Toronto, Ont. 48-49-13

Agents Wanted

Large United States manufacturer desires to appoint agencies in Canadian territories, where not already represented, for the best line of Concrete Waterproofing coatings made. Attractive proposition. Box 621, Contract Record, Toronto, Ont. 42-53 T.F.

Situations Vacant

City Engineer Wanted

Applications will be received by the undersigned up to **December 16th, 1912**, for the position of City Engineer of the City of Peterborough. Applicant will state qualifications, experience and salary expected.

S. R. ARMSTRONG,
City Clerk.

Nov., 19, 12

48-49

Business Buildings and Industrial Plants

(Continued from page 73)

street, will erect factory to manufacture compressed fuel from the refuse material from their mills.

Vineland, Ont.

Remodelling canning factory for The Vineland Canning Co. Sec., Wm. Fretz. Additional equipment will be installed. Further information from secretary.

Waterloo, Ont.

Sash and door factory, cost $36,000, planned for Reitzel Bros., Foundry St., who are negotiating with city for loan of $20,000. By-law will probably be prepared at once. Factory two storeys, 100 x 150, brick construction, also boiler house and dry kiln machinery required.

Weyburn, Sask.

Factory. The Weyburn Sash, Door & Glass Company will double size of plant next year by an addition of 140 x 195 ft.

Welland, Ont.

Boiler house and chimney to cost $7,000 planned for Can. Billings & Spencer, Ltd., Major street. Brick construction. Permit has been applied for.

Wiarton, Ont.

Flour and grist mill to cost $8,000 planned for Chas. Reckin. Ratepayers voted on by-law Nov. 22nd. 3-sty., 60 x 39, stone and brick construction, iron roofing, modern roller process manufacturing machinery required.

Factory (extensions and alterations) planned for Northern Rubber Co., Ltd. Promoter, W. L. Nelson, Cleveland, Ohio. Ratepayers voted on by-law Nov. 22nd. New machinery required, alterations are also planned for knitting factory for David E. Kerr, of Cleveland, Ohio.

CONTRACTS AWARDED

Calgary, Alta.

Stable to cost $5,000 (3rd avenue W.) Owner and general contractor, P. Pallisen, 11th avenue W. Builder, Archer Bros. & Singley, 640 18th avenue. 2-sty., 100 x 50, cement foundation, frame construction, concrete floors.

Garage to cost $10,000 for G. H. Dick, 2413 Cliff Road. Builder and general contractor, W. Steaman, 1522 13th Ave. 2-sty., 52 x 99, cement foundation, brick construction, concrete floors.

Stores to cost $9,000, 12th avenue W., for Capt. C. E. Amphlett, Marlborough Apts. Architect and general contractor, F. W. Faux, 23 Marlborough Apts. 1-sty., 110 x 50, cement foundation, brick construction. Excavating started.

Stores and rooms to cost $4,000, Leeds. Owners and builders, Archer & Robertson, Dom Bank Bldg. 2-sty., 21 x 60, cement foundation, brick construction. Excavating started.

Store and apartments to cost $10,000 Sunnyside avenue. Builders and general contractors, McLean Engineering Co., Verdome Block. 2-sty., 112 x 41, cement foundation, brick construction. Excavating started.

Collingwood, Ont.

Remodelling building, Hurontario St., for Donald MacKay, 3rd and Pine Sts. Architect, Philip C. Palin. Mason, Thomas Bully. Carpenter, Robt. Allen. Plumbing, W. Parrott. Ptg., glazing and plastering not yet awarded. Building to be converted into 2 stores with apartments on 1st floor. Plate glass fronts, store fixtures, etc., required.

Hamilton, Ont.

Warehouse and factory, cost $18,000, for Robertson Bros., 12 Mary street, Confectioners. Manager, D. Fleming. Architect, D. J. Corrigan, 54 Catherine St. N. General contractor, Alex Milne, 60 Mary street. Two storeys and basement, concrete foundation, brick and structural steel construction, pressed brick front.

Addition to factory to cost $5,000. Owner and general contractor, Canada Screw Co., 1[illegible] Wellington street N. Mgr., J. Orr Callaghan. Architect, Mills & Hutton, Bank of Hamilton Bldg. Brick and steel construction.

Paper box factory, Steven street, for C. Reid & Co., 16 Walnut street S. Architect, E. B. Patterson, 167½ King E. Mason, S. Kerr, 408 Garth street. Carpenter, J. H. Coleman, 198 Avondale ave. 2-sty. and basement, cement foundation, brick lined, to be completed by May.

Alterations bank and office building to cost $20,000, 137 James street S., for Bank of Toronto, Head Office, Toronto. General contractor, W. H. Cooper, 197 Emerald street N. Office furniture, fittings, plate glass windows required.

Montreal, Que.

Office and show room, cost $4,200, 24 McGill College ave., for T. B. Drouin, 164 McGill street. Builder, A. C. Barber, 926a St. Catherine W. Three stys., 26 x 49, brick construction, cement fndn. Foundations in.

Garage, cost $5,000, Chestnut, for Tooke Bros., Ltd. General contractors, B. G. Loomis & Son, St. Patrick street. One storeys, 39 x 50, brick construction, stone foundation.

Laundry to cost $6,000, Descaries. Owner and builder, Fabrique de N. D. de Grace, Dominion Convent. 1 sty., cement foundation, brick construction.

Store and factory to cost $6,000, St. Dominique, for Glickman & Glickman, 124 St. Lawrence. Architects, Dufort & Decary, La Patrie Bldg. General contractor, Mr. Personvitz, 935 St. Dominique. 3-sty., 32 x 66, pressed brick construction, cement foundation.

Storage to cost $12,000, 36 Duke St., for Montreal Cotton & Wool Waste Co., 173 Common. Architect, R. Charbonneau, 17 St. James. General contractor, Mr. Cadieux, 99 Wellington. 3-sty., 74 x 55, brick and stone construction, cement foundation.

Factory to cost $9,200, for R. C. Jamieson & Co., Island and St. Patrick. Architects, Thos. Pringle & Son, Ltd., Coristine Bldg. General contractor, E. B. Evans, 71 St. Denis. 2-sty., 80 x 30, brick and mill construction. Foundations in.

Ottawa, Ont.

Alterations to store, Sparks street, for A. P. Sherwood, 81 Laurier avenue W. Architect, C. J. Burritt, Sparks Chmbrs. General contractor, A. E. Rivers, 270 Arlington. Brick construction, store fronts and fixtures.

Regina, Sask.

Warehouse to cost $28,000, Osler St., for The Minneapolis Threshing Machine Co. Architect, N. R. Darrah, Western Trust Bldg. General contractors, Smith Bros. & Wilson, Regina. 165 x 86, brick foundation, brick construction. Excavating started.

Toronto, Ont.

Stores and residence, cost $3,530, Dundas near Grove ave., for H. McKenzie, 123 Simcoe street. Builders, Hill & Strathy, 123 Simcoe street. Stone fndn., brick construction.

Garage for D. I. Sellers, 192 Carlton street, and J. A. Hill, 7 Fairview Blvd. Garage on Hutchinson avenue. Builder, A. C. Salisbury, 217 Sumach street. Brick construction.

Warehouse to cost $3,000, 150 Walnut avenue, for D. Herman, 63 Elizabeth St. Architect and builder, H. P. Pullman, su

D'Arcy street. 3-sty. and basement, cement foundation.

Store, 94 Bathurst street, for W. Hammill, Indian Grove. Builders, W. Halls & Sons, 6 Park Place. Stone foundation, brick construction.

Factory to cost $3,000 for R. Dack & Son, 177 King street W. Builder, J. A. Hamer, 188 King street W. 3-sty., brick, stone foundation.

Waterloo, Ont.

Bottling warehouse for Kuntz Brewery Ltd., William street. Manager, A. Bauer. Architects, Mildner & Eisen, 1018 Hammond Bldg, Detroit. General contractors, Magnus & Sons, Chicago, Ill. 1-sty., 180 x 60, cement, brick and fireproof construction.

Winnipeg, Man.

Stores to cost $5,000, Main street. General contractor and architect, L. R. Clements, cor. Balmoral and Ellice. 1-sty., 66 x 80, brick, stone foundation. Foundations in.

Residences

Galt, Ont.

Residence to cost $4,000, Brand road, for Mr. Fallen, c/o Getty & Scott, Water street N. 2-sty., 28 x 36, stone and brick foundation, brick construction. Plans ready; foundations in.

Kingston, Ont.

Bungalow to cost $3,000 for D. Blackhall. Architects, Designing & Draughting Co., 36 Toronto street, Toronto. 1½-sty., stone foundation, brick construction. Plans in progress.

Lambeth, Ont.

Residence to cost $4,000 planned for Alfred Davey. Brick or cement block construction. Work will commence in the spring.

Middleton, N.S.

Residence to cost $3,500 planned for J. A. Gates. Tenders to be called next spring. Concrete foundation, frame construction.

Residence to cost $3,000 planned for Capt. F. A. Brown. Tenders to be called in December. Work not to start till next spring. Concrete foundation, frame construction.

Montreal, Que.

Residence, cost $6,000, 8th ave., Rosemount, for H. Sistage. Architect, J. A. Ouellet, 250 Amherst. Three storeys, stone foundation, brick construction. Plans drawn.

2 residences to cost $8,600, Laprairie, for Paul Bourdeau, 113 Manufacturers St. Architect, J. E. Bennoit, c/o owner. 2-sty., 52 x 42, brick veneer construction, cement foundation. Tenders called.

Toronto, Ont.

Residence to cost $7,000, E.S. Keele street, for Wm. Halls & Sons, 6 Park Place. Brick construction, stone foundation. Plans drawn.

Residence to cost $4,000, Dixon and Rockwood avenue, for J. Wilson, Follis and Manning avenue. Architects, Ellis & Connery, Manning Chambers. 2½-sty., stone foundation, brick construction. Plans drawn.

Residence to cost $5,000, Ramsford Rd. Owner and builder, M. R. Sherris, 1 Oriole Gardens. Architect, J. G. Hedges, 34 Yonge street. Brick foundation and construction. Plans drawn.

Residence to cost $3,600, Laughton avenue. Owner and builder, Francis Cull, 156 Concord avenue. 2-sty., stone foundation, brick construction. Plans drawn.

Residence to cost $5,700, 24-8 Caroline avenue, for W. G. King, 416 Palmerston Blvd. Stone foundation, brick construction. Plans drawn.

Residence to cost $4,000, Keele street, for Chas. O. Lasku, 426 West Marion street. 2½-sty., stone foundation, brick construction. Plans drawn.

Residence to cost $3,500, Perth avenue, for M. McKenzie, 20 Alpine avenue. Architect, W. Fraser, 34 Victoria street. Stone foundation, brick construction. Plans drawn.

Residence to cost $4,900 for Jno. Meldrum, 1296 Lansdowne avenue. 2-sty., brick foundation and construction. Plans drawn.

Winnipeg, Man.

Residence to cost $4,500 for D. H. James, Lipton street. 2-sty., 22 x 30, frame, stone foundation. Plans ready; foundations in.

Woodstock, Ont.

Manse to cost $10,000 for Knox Church. Chairman Building Committee, G. R. Patullo. Architects, Burke, Horwood & White, 28 Toronto street, Toronto. Brick construction, fireplaces, modern conveniences. Plans in progress.

CONTRACTS AWARDED

Calgary, Alta.

Residence to cost $35,000, Mt. Royal, for A. A. Dick. Architect, Holman & Gotch. General contractors, Jones & Lyttle. 2-sty., 68 x 35, cement foundation, brick construction.

Residence to cost $4,000, Sunalta. Owner and general contractor, W. Wilkin. Architect, C. E. Viunedge, 202½ 1st street N.W. 2-sty., 36 x 35½, cement foundation, frame construction.

Residence to cost $6,000, Mt. Pleasant, for J. Bennett, 440 14th avenue N.E. Builders and general contractors, Bennett & Debrana, 442 14th avenue N.E. 2-sty., 40 x 27, cement foundation, frame construction.

Residence to cost $4,500, Sunalta, for Mrs. C. W. Coully, Staveley, Alta. Builder and general contractor, R. Paterson, 837 4th avenue N.W. 2-sty., 22 x 39, cement foundation, frame construction.

2 residences to cost $6,000, Rosedale. Owner and general contractor, D. Chisholm, 52 McDougall Blk. Builder, E. Mallory, 2332 16th street E. 2-sty., 19 x 28, cement foundation, frame construction. Excavating started.

2 residences to cost $5,500. Architect and general contractor, J. J. Davidson, 1317 15th avenue. 2-sty., 19 x 40, cement foundation, frame construction.

Hamilton, Ont.

Apartment house to cost $10,000. Owner and general contractor, Alex. Milne, 67 Mary street. 3-sty. and basement, concrete foundation, brick construction.

Residence to cost $3,000, 334 Cumberland avenue. Owner and general contractor, Andrew Schou, 43 Emerald street N. Concrete foundation, brick construction.

Residence, cost $4,500, for A. W. Robinson, 36 James street south. Mason, J. Pollard, Valley Inn. Carpenter, R. S. Spicer, 324 Herkimer street. Two stys., brick construction, pressed brick front.

Montreal, Que.

Residence, cost $4,800. Owner and builder, J. W. McDiarmid, 312 St. Philip. Two storeys, 79 x 20, cement foundation, brick veneer construction.

Residence to cost $4,200, St. Dominique. Owner and builder, Ubric Dubois, 2111 St. Urbain. 3-sty., 24 x 56, stone foundation, brick construction. Foundations started.

Residence to cost $3,000. Owner and builder, D. Cambeau, 72 Debiencour. 2-sty., 25 x 80, brick veneer construction, stone foundation.

Residence to cost $3,000. Owner and builder, Benoit Despaties, 2073 Christophe Colombe. 2-sty., 25 x 45. stone foundation, brick construction. Excavating started.

Residence to cost $4,600. for J. Robert, 632 Frontenac. Builder, P. Daniel, 35 Hogan. 3-sty., 33 x 52, brick construction, cement foundation. Foundations in.

Residence, to cost $4,000, for Antoine Despaties, 820 Dorchester. Builder, Benoit Despaties, 2073 Christophe Colombe. Three storeys, 25 x 40, stone foundation, brick construction. Foundations in.

Residence to cost $3,000, Hochelaga. Owner, Joseph Latreille, 193 Hogan. 2-sty., 25 x 40, brick, cement foundation.

Residence to cost $6,000, Fullum. Owner and builder, Alph Larose, 552 Marquette. 3-sty., 60 x 42, stone foundation, brick veneer construction. Foundations in.

Residence to cost $3,600, Cartier. Owner and builder, P. Lepains, 1422 Parthenais. 3-sty., 25 x 40, stone foundation, pressed brick construction.

2 residences to cost $9,000, Desire. Owner and builder, A. Leduc, 453 Nicolet. 3-sty., 50 x 44, brick construction, cement foundation.

Residence to cost $4,800, Alice, for Girston Galarneau, 2001 Christophe Colombe. General contractor, Nap Gavarneau. 3-sty., 40 x 40, brick construction, cement foundation. Foundations in.

Residence to cost $3,500, Sanguinet. Owner and builder, Dan Murphy, 2393 Drolet. 2-sty., 32 x 43, cement foundation, brick construction.

Residence to cost $4,800, 7a Lincoln avenue, for John S. Prince, 500 Guy St. Builder, Wm. E. Doran, 189 Bleury. 4-sty., 14 x 40, brick, cement foundation.

Ottawa, Ont.

Residence to cost $5,500, Powell. Owner and builder, R. A. Kemp, 149 1st avenue. 26 x 36, brick veneer construction, stone foundation.

2 residences to cost $14,000, Clarence. Owner and builder, Wm. Fields, 620 Cumberland. 34 x 52, stone foundation, double brick veneer construction.

Residence to cost $4,700, Church. Owner and builder, E. Goud, 176 Bolton. 29 x 52, cement foundation, double brick veneer construction.

Residence to cost $3,700, Glen, for Mrs. Bowden. Builder, G. Ramsay, 399 Nepean, Ottawa. 24x30, stone foundation, brick veneer construction. Foundations started.

Residence to cost $3,500, 2nd avenue. Owner and builder, J. W. Nelson, 130 bois, 3 Ella street. 34 x 40, stone foundation, double brick veneer construction.

Residence, cost $4,000, Boyd ave. Owner and general contractor, H. Schafer, 630 McMillan ave. Three storeys, 20 x 28, stone foundation, frame construction.

Toronto, Ont.

Residence to cost $4,000, St. Andrews Gardens. Owner and builder, Omar Hoover, 136 Geoffrey street. 2½-sty., brick, stone foundation. Plans drawn.

Apartment to cost $8,000, Simcoe near Anderson, for Chas. Postermack, 227 University avenue. Builder, D. Haverity, 12 Bellview avenue. 2-sty. and basement, stone foundation, brick construction.

Residence and garage to cost $5,000, Willcocks street, for A. C. Walder, 22 St. Patrick street. Architect, F. R. Berry, 1107 College street. Builders, Wickett Bros., 35 Deer Park Crescent. Brick foundation, brick construction.

Residence to cost $3,200, Quebec ave. Owners and builders, Sanderson & Rae, 42 Pacific avenue. 2-sty., brick foundation and construction.

Residence to cost $3,500, Eleanor ave. Architect and builder, J. S. Case, 148 Close avenue. 2½-sty., 34 x 24, stone foundation, brick construction.

Residence to cost $18,000, Dunvegan road, for Z. G. Lash, 27 Grenville street. Architects, Bond & Smith, 19 Wellington street. Mason, Elgie & Page, 21 Havelock street. Carpenter, C. A. Bradshaw, 183 Davenport road. 2½-sty., cut stone and tile construction.

1 pair semi-detached residences to cost $7,000, 405-7 Runnymede road, for Louis Kaldofsky, 213 Gilmore avenue. Architect, W. Milliship, 193 Gilmore avenue. Builders, Rosenfeld Bros., 572 Annette street. Cut stone and brick construction.

Residence to cost $4,000, Shaw and Manchester. Owner and builder, F. Gewer, 589 Concord avenue. Architect, G. Miller, 1046 Dovercourt road. 2½-sty., stone foundation, stone and brick construction.

Residence and stables to cost $3,000, 87 Woodbine avenue, for Geo. Treadway, 180 Queen E. Builder, C. Jones, 180 Queen E. 2-sty., brick foundation, brick veneer construction.

4 residences to cost $12,000, Jackman avenue. Owner and builder, W. W. Fox, 16 Otter avenue. Brick foundation, brick construction.

1 pair dwellings to cost $7,500, Alberta avenue. Architects and builders, Smith & Swain, 294 Perth avenue. Brick and cut stone construction, stone foundation.

Residences to cost $5,000, W.S. Edwin avenue. Architects and builders, Davis & Moore, 176 St. Clarens avenue. 2-sty., brick, stone foundation. Owners purchase all material.

2 residences to cost $7,000, 109-11 Hilton avenue. Owner and builder, S. C. Kerriggan, 816 Palmerston avenue. 2½-sty., brick foundation, brick construction. Plans drawn.

Winnipeg, Man.

Two residences, cost $6,000, Craig St. 3rd avenue. 25 x 35, brick veneer construction, stone foundation.

Residence to cost $3,700 for Mrs. Mary May, 63 Grosvener. Builder, T. E. Gad- Owner and builder, Carl Nelson, 697 Strathcona street. Two storeys, 24 x 30, frame construction, stone foundation.

Two residences, cost $8,000, Westminster ave. Owner and general contractor, S. J. Hall, 93 Harriet street. Two stys., 26 x 30, stone foundation, frame and brick construction. Foundations in.

Residence to cost $3,000. Owner and general contractor, H. Birkhill, 765 Ellice. 2½-sty., 22 x 30, brick foundation, frame construction. Excavating started.

Residence to cost $4,500, Alfred ave. Architect and general contractor, Reedin Stone Co., North Main street. 2-sty., 22 x 28, frame, stone foundation. Foundations in.

2 residences to cost $14,500, Dorchester avenue. Architect and general contractor, J. Malcolm, 523 Telfer. 2-sty., 32 x 32, frame, stone foundation. Foundations in.

Residence to cost $4,500, Alfred ave. Owner and builder, J. Sternberg, 360 Flora avenue. 2-sty., 24 x 26, frame, stone foundation. Excavating started.

2 residences to cost $5,000, Craig. Owner and builder, J. H. Clarke, 169 Arlington. 2-sty., 20 x 24, frame construction, cement foundation. Foundations in.

Residence to cost $3,000. Owner and general contractor, C. Dennison, Dudley avenue. Two storeys, 22 x 32, stone foundation, frame construction. Excavating started.

Apartments, cost $120,000, McMillan and Annesley ave., for the Belge Canadian Real Estate Co. Manager, W. J. Christie. General contractors, Claydon

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Warehouse to cost $12,000, Windsor St., for A. C. North, 1006 McArthur Bldg. General contractors, Davidson & McGreevy, c/o owner. Two storeys, 66 x 40, cement foundation, brick construction. Foundations in.

Power Plants, Electricity and Telephones

Hamilton, Ont.

Addition to transformer station to cost $4,000. Mayor, Geo. H. Lees. Clerk, S. H. Kent. Plans in progress.

Kingsville, Ont.

The installation of an electric light system is under the consideration of the town council. Further information from clerk, George Pearse.

London, Ont.

Extension to lighting and heating plant planned for the Helena Costume Power Plant, 196 King street (J. W. Little, c/o Robinson Little Co.) Specifications are being prepared.

Regina, Sask.

Power house, laundry and refrigerating plants. City Commissioner, L. A. Thornton. Consulting engineers, Wenger & Cockburn, room 208, Alden Blk., 12th avenue. Plans, specifications, etc., at Builders Exchange, Winnipeg., and consulting engineers' office. Tenders received by City Commissioner until Dec. 14. Plants to be installed in connection with the Regina General Hospital.

Revelstoke, B.C.

The town council is considering installation of standard street lighting system.

Souris, Man.

Electric lighting plant to cost $40,000 planned by the town council. Mayor, A. Hughes. Clerk, J. W. Breakey. By-law will be submitted in December.

Toronto, Ont.

Addition to battery house to cost $8,000, Terauley street, for Toronto Electric Light Company. Architect, H. G. Salisbury, 12 Adelaide street. One sty., brick and reinforced concrete construction. Plans drawn.

West Lorne, Ont.

Electric light plant planned for the West Lorne Electric Lighting Co. Mgr., W. Webster. Mason, Albert Smith. Carpenter, Wm. Merritt. Machinery, Canadian Fairbanks-Morse Co., 26 Front St. W., Toronto. Excavating started.

Winnipeg, Man.

Power transmission line to cost $17,200. Contract was awarded to City Light & Power Dept. for 13,000 volt line to new wells. Board of Control. Sec., M. Peterson. Engineer, J. G. Glassco, 54 King street W.

Steam turbine plant as stand-by for the power plant planned. Proposed location near the Winnipeg Steam Heating Co.

West Hamilton, Ont.

The Dundas Municipal Hydro-Electric System in conjunction with the Hydro-Electric Commission will install electric system and service in village if residents co-operate. Matter has been approved of by local council and H. E. P. Commission. About 1 mile of poles and wires to connect with the Dundas-Caledonia Branch, transformers, etc., required. The Hydro-Electric Commission will build extension if scheme goes through, after which it will become a part of the Dundas Municipal System. Chairman Local Hydro Committee, Ald. R. W. Karch, Dundas.

Miscellaneous

Hamilton, Ont.

Wm. Condon, proprietor Stockyards Hotel, is planning to install a new steam heating plant; 84 radiators of various sizes required.

Winnipeg, Man.

Underground service cable. General contractor, The Imperial Wire & Cable Co., 22,000 ft. B. & S. lead covered cable at $3090. Board of Control. Sec., M. Peterson. Engineer, J. G. Glassco, 54 King street.

Business Notes

London, Ont.

Factory of Wright Hat Company destroyed by fire, loss $35,000.

Ottawa, Ont.

Newspaper office of Le Temps, Sussex street, burned. Owner by Dominion Government, Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa.

Prescott, Ont.

Customs offices and freight sheds on St. Lawrence River, of C. P. Ry., head office, Montreal, destroyed by fire.

St. Flavien De Lotbiniere, Que.

Store and residence of J. G. Roy destroyed by fire; loss $25,000. Will rebuild.

Sarnia, Ont.

Hub and spoke factory owned by J. S. Loughead Estate destroyed by fire; loss $40,000.

Sault Ste. Marie, Ont.

The Superior Oil Co.'s warehouse destroyed by fire.

New Companies

Fibre Products Limited, incorporated with a capital of $250,000 to carry on business as manufacturers, wood, chemical pulp, &c., to acquire timber limits, saw mills, &c., necessary for the said business. The head office is at Thorold. The provisional directors are F. W. Manson, G. J. Manson, maufrs., and A. W. Marquis, barrister, all of St. Catharines.

The Cedar Valley Brick Company, Limited, has been incorporated with a capital of $150,000 to erect buildings and deal in all kinds of building materials, with head office at Toronto. The provisional directors are M. D. Jones, salesman, P. H. Ellis, broker, and G. G. Plaxton, barrister, all of Toronto.

The Acme Furniture Company, Limited, has been incorporated with a capital of $40,000 to manufacture and deal in lumber, furniture and other like products, with head office at Berlin. The provisional directors are Jno. Lauffer, traveller, Jos. Hunt and P. L. Kroetsck, mechanics, all of Berlin.

The Foreman Motor and Machine Company, Limited, has been incorporated with a capital of $40,000 to manufacture, install and utilize machinery and other apparatus for the generation and supply of light, heat and power, with head office at Toronto. The provisional directors are G. H. Foreman, engineer, T. H. Sharp and Robt. Petman, accountants, all of Toronto.

The Hamilton Labor Temple Association, Limited, has been incorporated with a capital of $100,000 to carry on business as a general land and building company, with head office at Hamilton. The provisional directors are A. Fontyn, Robt. Pevler, cigar makers, Albert Blythe, carpenter, all of Hamilton.

Russell Timber Company, Limited, has been incorporated with a capital of $50,000 to operate timber limits, to cut and sell timber and lumber and do a general lumbering and contracting business, with head office at Port Arthur. The provisional directors are T. A. Reed, accountant, W. F. Langworthy, A. J. McComber, barristers, all of Port Arthur.

Forest Products Company, Limited, has been incorporated with a capital of $40,000 to manufacture logs, lumber, wood products, &c., with head office at Peterboro. The provisional directors are H. G. Rogers, wood dealer, H. G. Logan, brewery manager, and W. H. Hill, insurance agent, all of Peterboro, Ont.

The Excelsior Brick Company, Limited, has been incorporated with a capital of $150,000 to manufacture and deal in all kinds of brick, tile and clay products, with head office at Toronto. The provisional directors are S. M. Long, S. G. Hoffman, real estate brokers, and J. A. Nelson, builder, all of Toronto.

Echo Park, Limited, has been incorporated with a capital of $40,000 to carry on business as a general land and building company with head office at Hamilton. The provisional directors are Wm. Lees, L. F. Stephens and H. S. Lees, barristers, all of Hamilton, Ont.

Ontario National Brick Co. has been incorporated with a capital stock of $2,000,000, to carry on business as manufacturers of brick, tile, terra cotta and other building supplies with head office at Montreal. The incorporators are E. R. Parkins, advocate, Wm. Taylor, bookkeeper, S. G. Dixon, all of Montreal.

Domestic Brick and Tile Company, Limited, has been incorporated with a capital stock of $500,000, to manufacture and deal in brick, tiles, drain and sewer pipes, etc., with head office at Montreal. The incorporators are Henry Lampard, mechanical engineer, of Westmount; J. A. Major, contractor, of Verdun, and H. M. G. Bellew, commission agent, of Montreal, Que.

Le Page Lumber Company, Limited, has been incorporated with a capital stock of $100,000, to carry on business as timber merchants, sawmill proprietors, etc., with head office at Winnipeg. The incorporators are W. B. Tomlinson, lumberman; F. A. Shaw, manager, and J. T. Le Page, lumberman, all of Winnipeg.

Western Builders Limited, incorporated, with a capital stock of $160,000, to carry on business as pier, bridge and wharf builders, etc., and to deal in all kinds of building material, with head office at Winnipeg. The incorporators are A. S. Burgess, real estate agent, J. A. Flanders, real estate agent, and G. D. Macvicar, barrister, all of Winnipeg.

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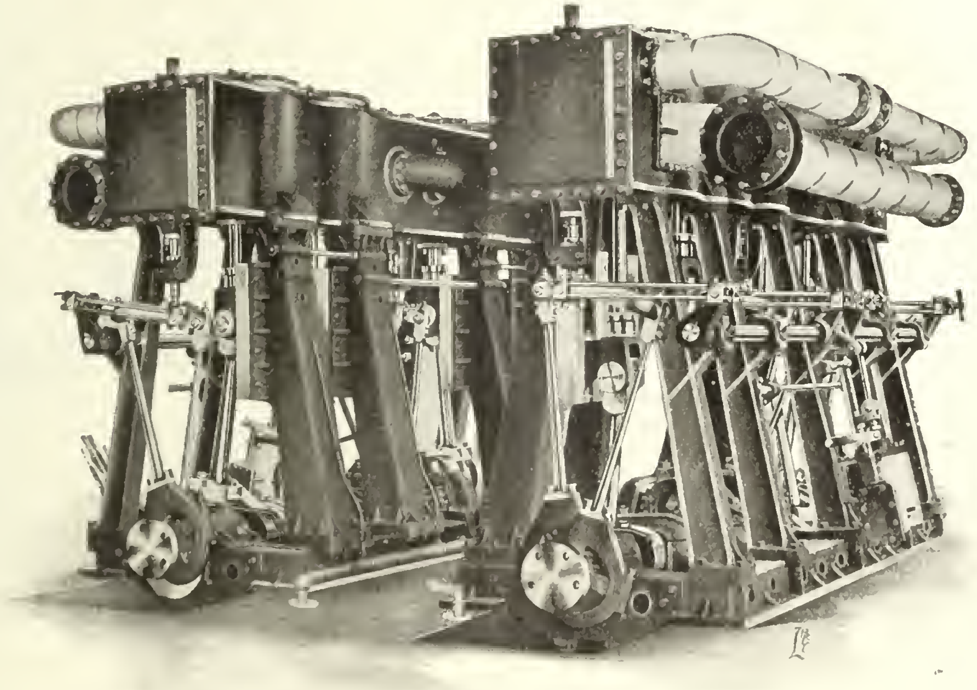

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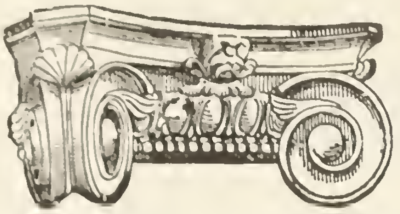

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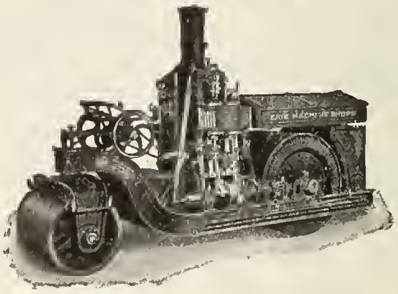

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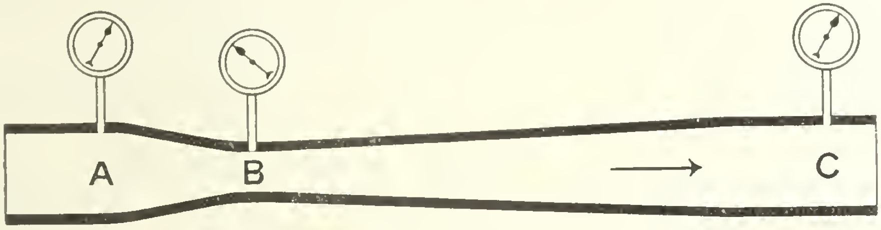
THE "VENTURI," BUILT BY **THE BUILDER'S IRON FOUNDRY**, IS THE ONLY TYPE OF METER WHICH CAN BE APPLIED SUCCESSFULLY TO SEWAGE MEASUREMENT.



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See Bulletin 75

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The principle is rapid filtration through sand enclosed in steel cylinders, washed mechanically.

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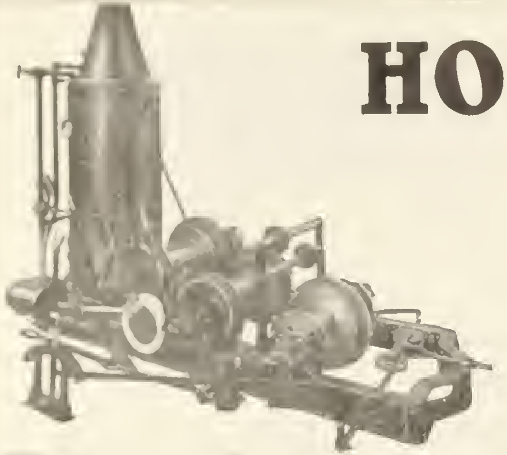

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Some of the strongest friends of the M. & H. Hoists are to be found among the men who have owned and used them. For instance the following written by one of the Lumber Kings of Canada—a man who telegraphed us an unsolicited order for another hoist not long ago.

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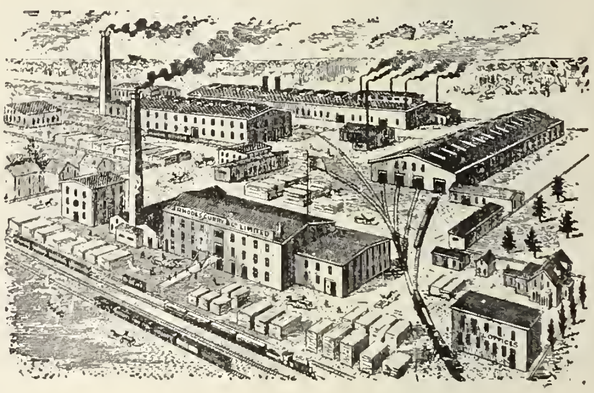

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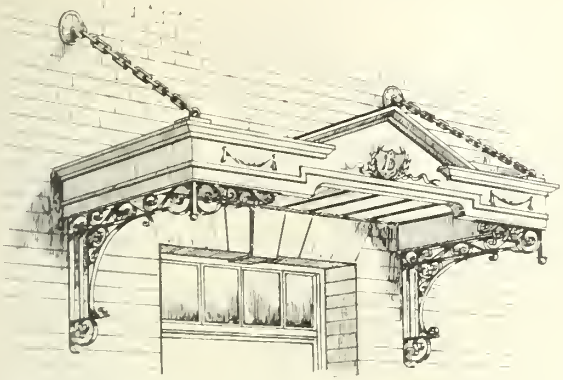

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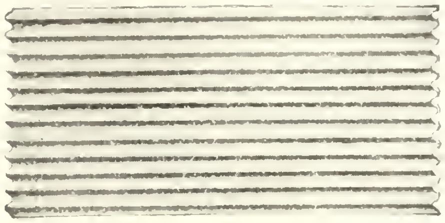

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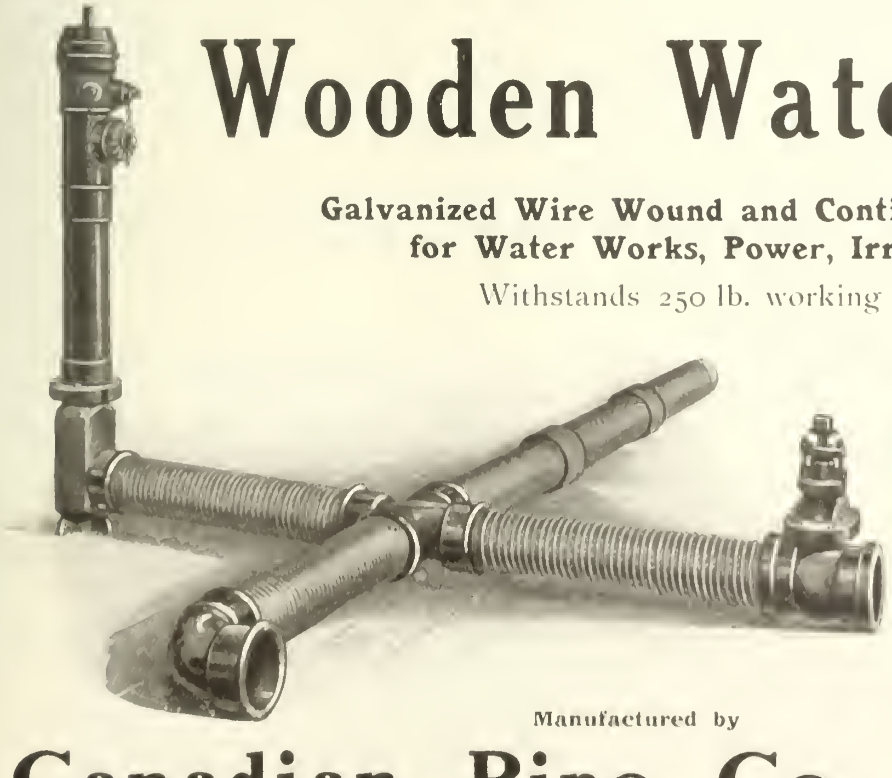

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"It is permanent because it is concrete"

Solves the Concrete Pavement Problem

UNTIL the advent of Dolarway, the success of concrete pavements was questioned. They were perfect in theory but did not work out in practice.

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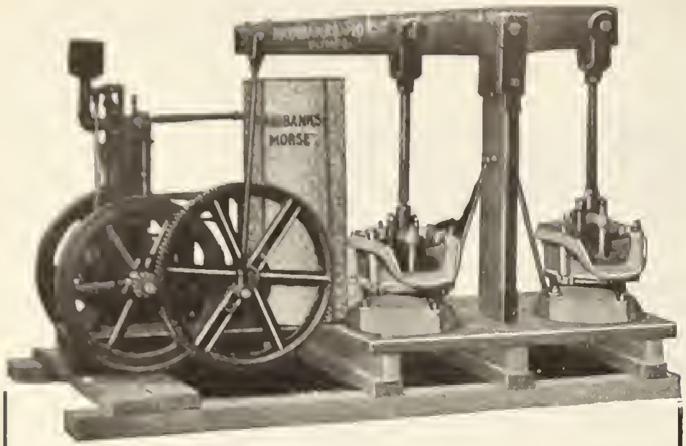

57 Cents per 10 Hour Day is the Cost of Operation

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2

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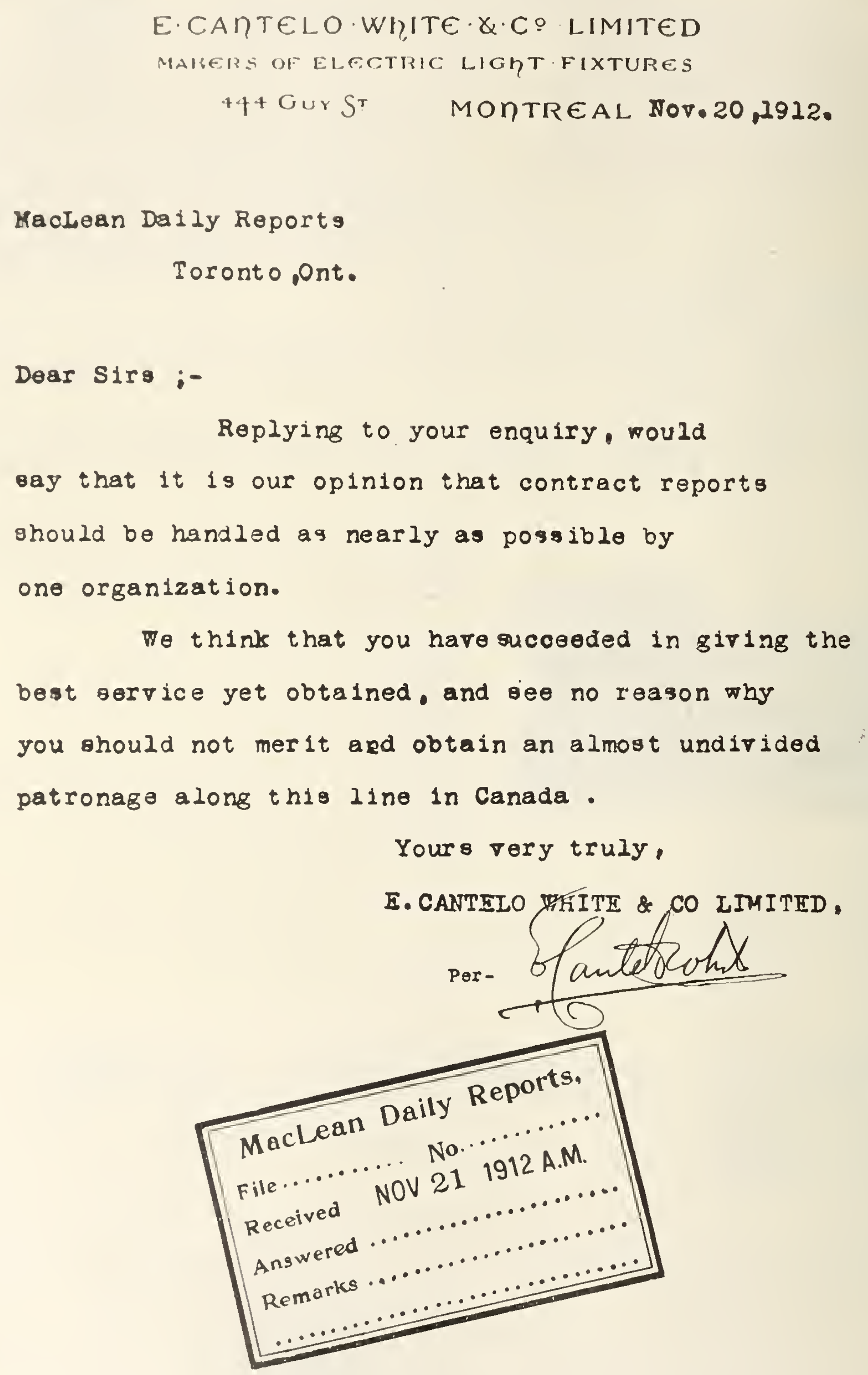

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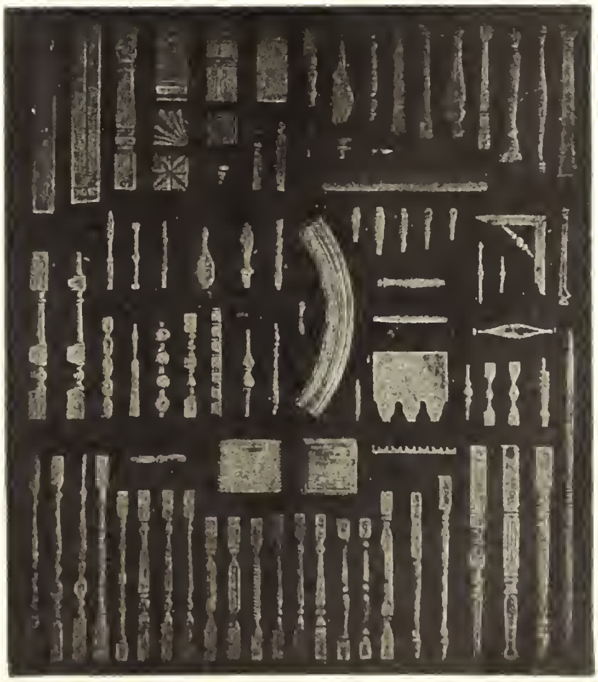

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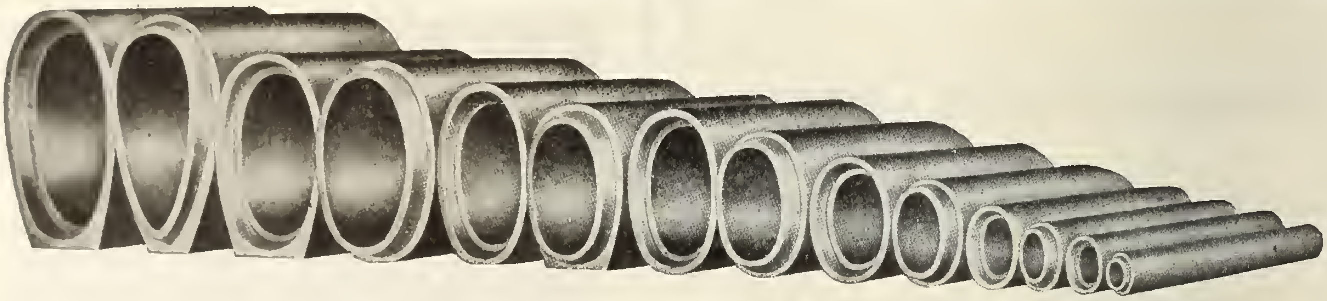

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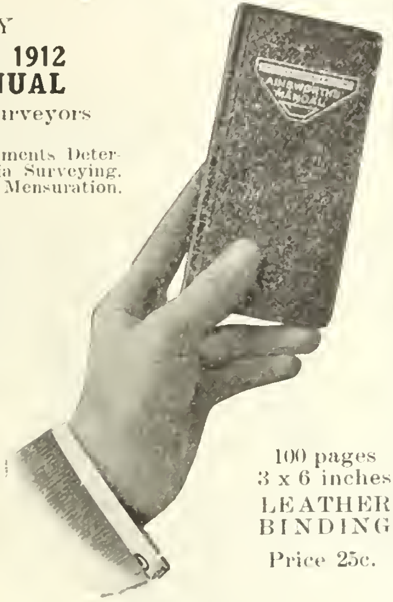

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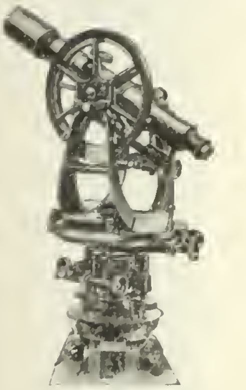

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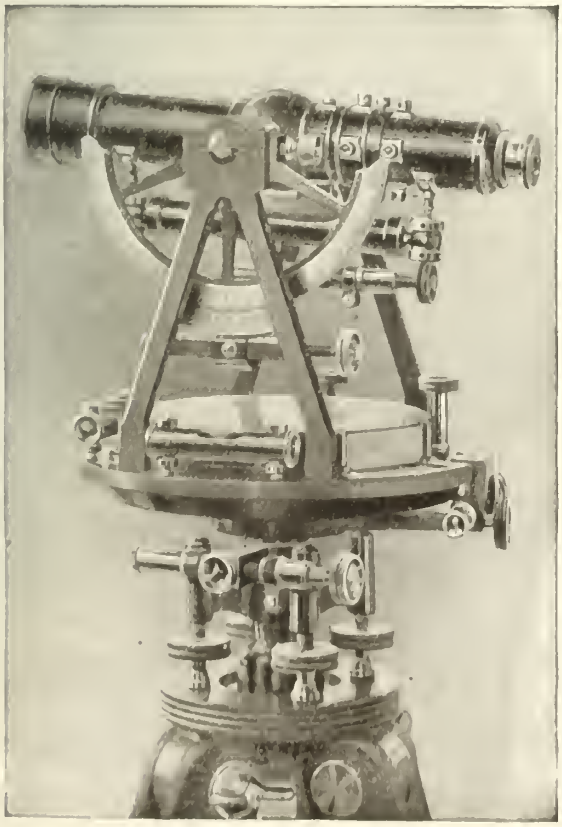

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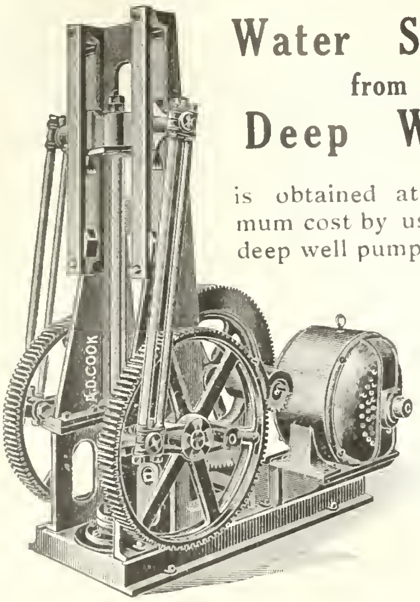

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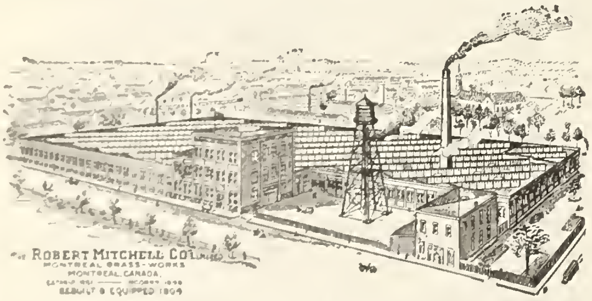

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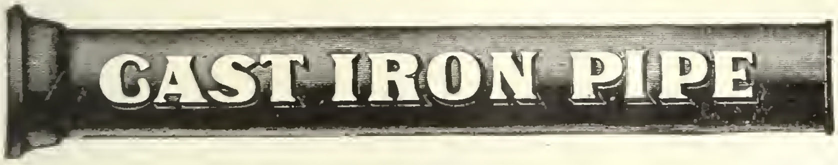

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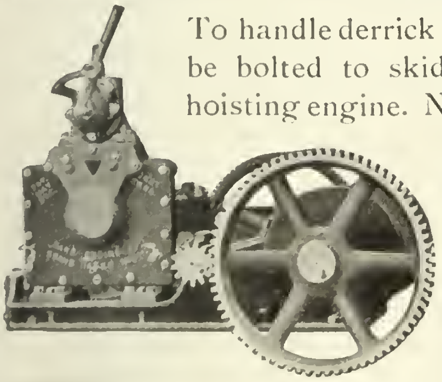

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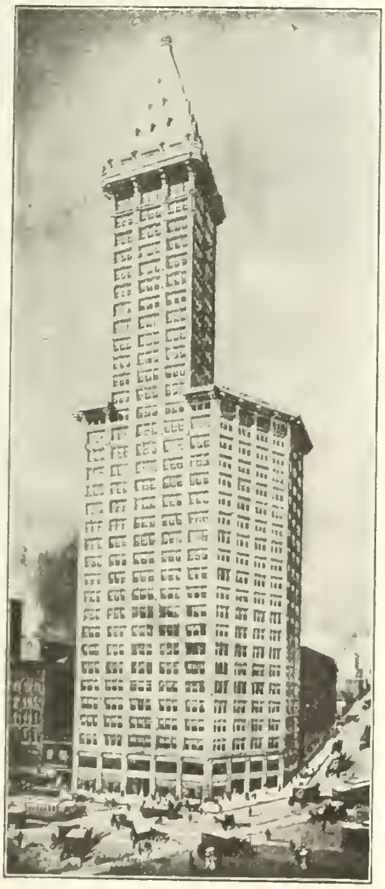

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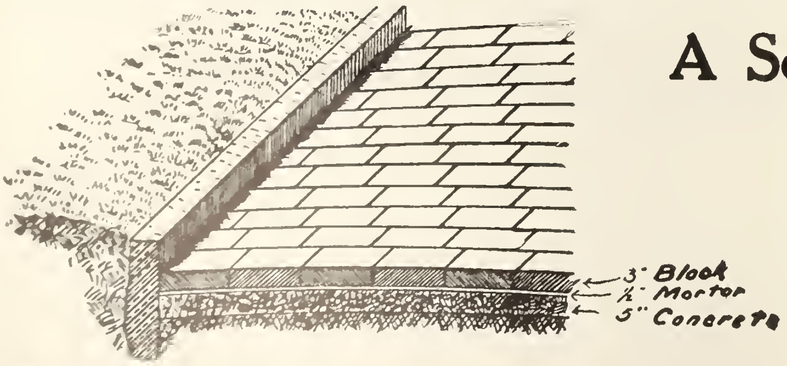

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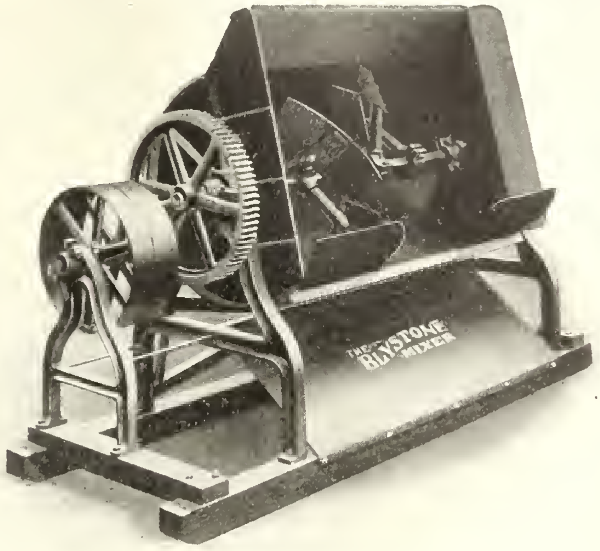

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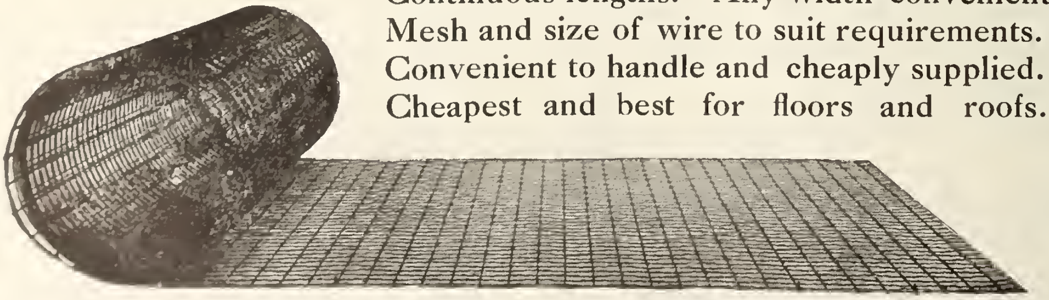

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Grey Stock Bricks	11 00
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No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

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2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00

Pine—

1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pine Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
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Pine trim for paint finish—

4 in. casing per 100 ft.	2 00
5 in. casing per 100 ft	2 25
8 in. pine base, per 100 ft.	3 25
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N B. Extras	3 50
N. B. Clears	2 90
No. 1 pine lath, per M.	4 75
No. 2 pine lath	4 25
No. 1 spruce lath	4 00

Cedar Posts Fence—

5 in. at small end, each	25
7 in. at small end, each	35
Hemlock lath	3 25

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London The discounts are 15 per cent for Star and 15 per cent. for D.D.

	Star	D.D.
10 to 25 united inches	$4 25	$ 6.25
26 to 40	4.60	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7 00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24.00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D
25	$3.25	$4.75
40	3.45	5.20
50	3.85	6.00
60	4.10	6.50
70	4.35	7.00
80	4 85	7.50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F O B Montreal

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3 50	5 00
26/40	3 75	5.50
41/50	4 25	6 25
51/60	4 75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

Net prices per 100 feet F.O.B. Winnipeg.

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 per cent.

High grade compression work, 55 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 and 10 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock .... net $1.85

No. 4½ Fuller's .... net $2.50

Square head brass cocks, 60 per cent.

Lead Pipe

Lead pipe, $7.50 net; lead waste, $9.00 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$2.04	¼ inch	$2.86
⅜ "	2.04	⅜ "	2.86
½ "	2.72	½ "	3.57
¾ "	3.16	¾ "	4.31
1 "	4.54	1 "	6.19
1¼ "	6.19	1¼ "	8.44
1½ "	7.43	1½ "	10.13
2 "	9.90	2 "	13.50
2½ "	15.80	2½ "	21.56
3 "	20.75	3 "	28.31

Malleable fittings—Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 67½; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 and 10 per cent.

Plain steel bars, $2.15.

Square twisted bars, ¾ to 1¼, $2.25.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 65 per cent.

7 and 8-inch pipe, 50 per cent.

Sewer Pipes

4-in.	25c ft.	15-in.	1.35 ft.
6-in.	40c ft.	18-in.	1.90 ft.
9-in.	65c ft.	20-in.	2.25 ft.
12-in.	1.00 ft.	24 in.	3.25 ft.

all less 60 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.80.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.55.

Crushed stone, 2-inch, $1.30; 1 inch, $1.35; ⅜-inch, $1.45.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered. $2.25 to $2.50 per yard.

Sand, for cement or brick work, $1.15 a yard, f.o.b. cars, Toronto siding.

Brown sills and heads, in the rough, delivered, 40 cents per foot.

Rubble stone in car lots, $1.30 per ton.

Steel channels and beams, $2.65 to $3.00 per 100 pounds, delivered f.o.b. Toronto.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, 9.00 in car lots.

Lime, per cwt., delivered, not less than 1,500 lbs., 33 cents; white, 43 cents.

Plaster of Paris, Anchor Brand, $1.50.

Manilla Rope, best, per pound, 12½ cents

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Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turnover buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address

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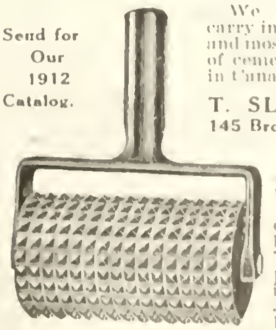
The WEEKLY FINANCIAL, COMMERCIAL & GENERAL TRADE NEWSPAPER of the GREAT WEST
WINNIPEG

Cement Sidewalk Tools



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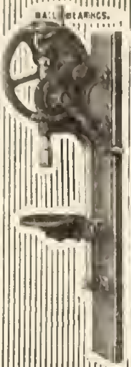
"Buffalo" Punches Shears and Drills



Among our recent designs is the Bar Cutter No. 10 for cutting concrete reinforced bars—twisted, round or any other shape. It cuts bars up to 1¼" thick and, due to its steel frame, its **weight is only half** that of a cast iron machine of the same capacity. Ask for catalog of Steel Punches, Shears and Drills No. 115.

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MONTREAL Limited
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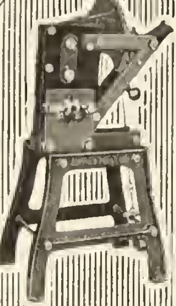

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"Built to Last"

is the slogan of our **1912 Rivet Forge**. The repair cost by this design is guaranteed to be actually **cut in two**, compared with any other forge now in the market. A bridge company using a large number of forges writes us regarding it: "The operator claims it runs easier and heats more rivets in less time than any forge he has ever used." Let us send you one on free trial. Fifty other styles, for light and heavy work.

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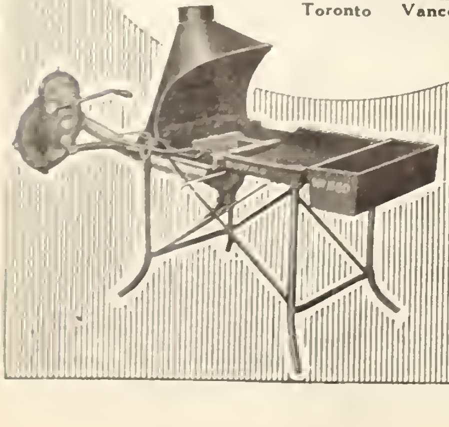
Toronto Vancouver



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Minerva Irish Felt—Considered by Engineers the best waterproofing medium in foundation work where pressures are to be met.

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Our No. 4 RANSOME MIXER

No. 4 Ransome Concrete Mixer.

is the equal of our larger machines in efficiency and is sold at a price which makes it an easy and a wise purchase for anybody.

It has a batch capacity of 4 cubic yards per hour, which is ample for any small concrete job. No. 4 Mixers are sold in one way only : i. e.—mounted on Trucks, with gasoline engine, direct drive. This is a powerful engine for its rated H. P. and the best designed—a most perfect operating engine.

The No. 4 Ransome is a great time saver in every respect. As we equip these machines with a special batch charging hopper, which is being filled while the batch in the drum is mixing—no time is lost in charging drum. By the simple lever arrangement, the whole unmixed batch is fed into the drum in an instant and the loading gang keeps right on with their work without any waits whatever. The batch is instantly discharged by merely reversing the discharge chute.

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Vol. 26 Toronto, December 11, 1912 No. 50

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Contract Record and Engineering Review

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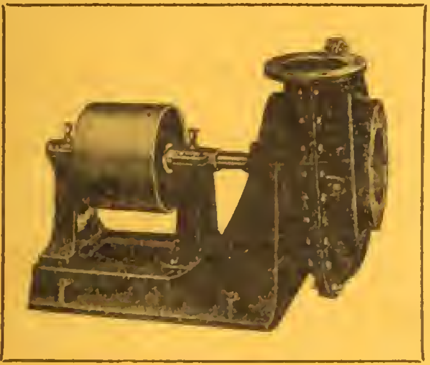

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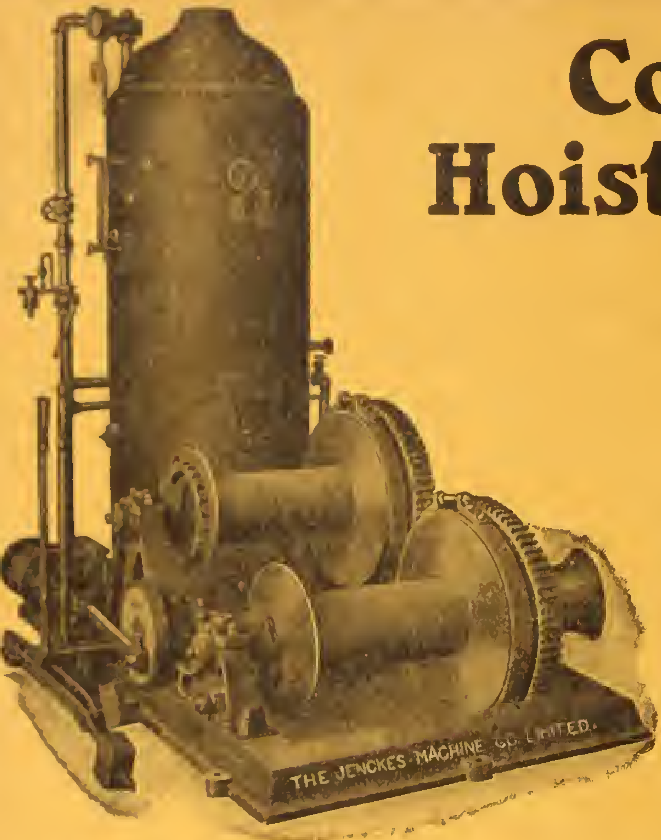
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¶ Built in all the popular sizes.

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which meet the three principal requirements of modern construction work

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There isn't a day that we don't help some contractor to success. May we help you today?

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IF a layman asked you — an engineer or a contractor — what you thought of concrete roads, what would you tell him?

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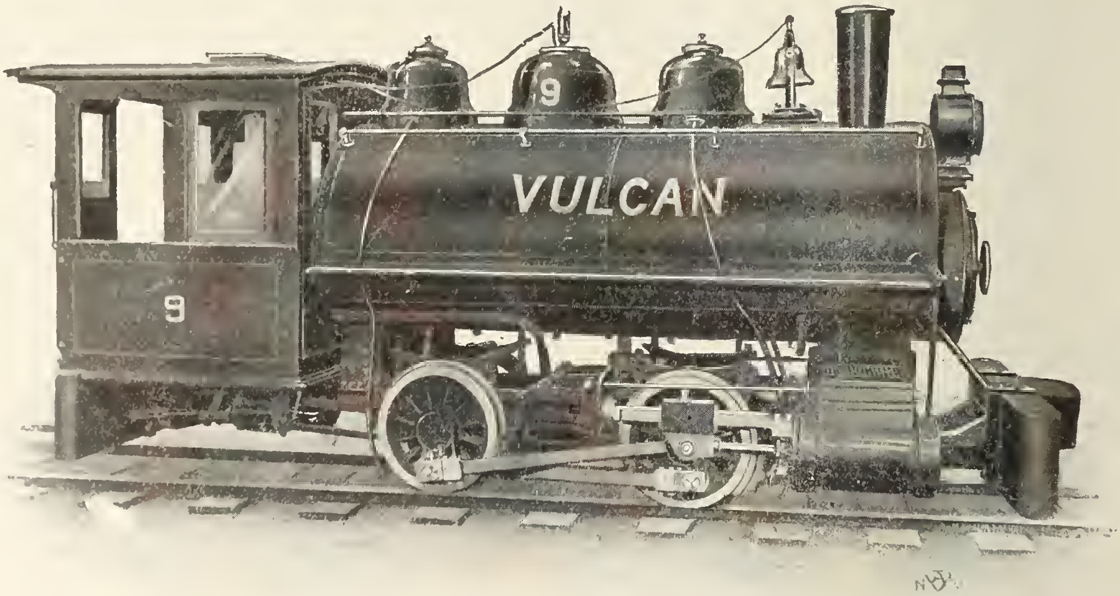
"VULCAN" Locomotives



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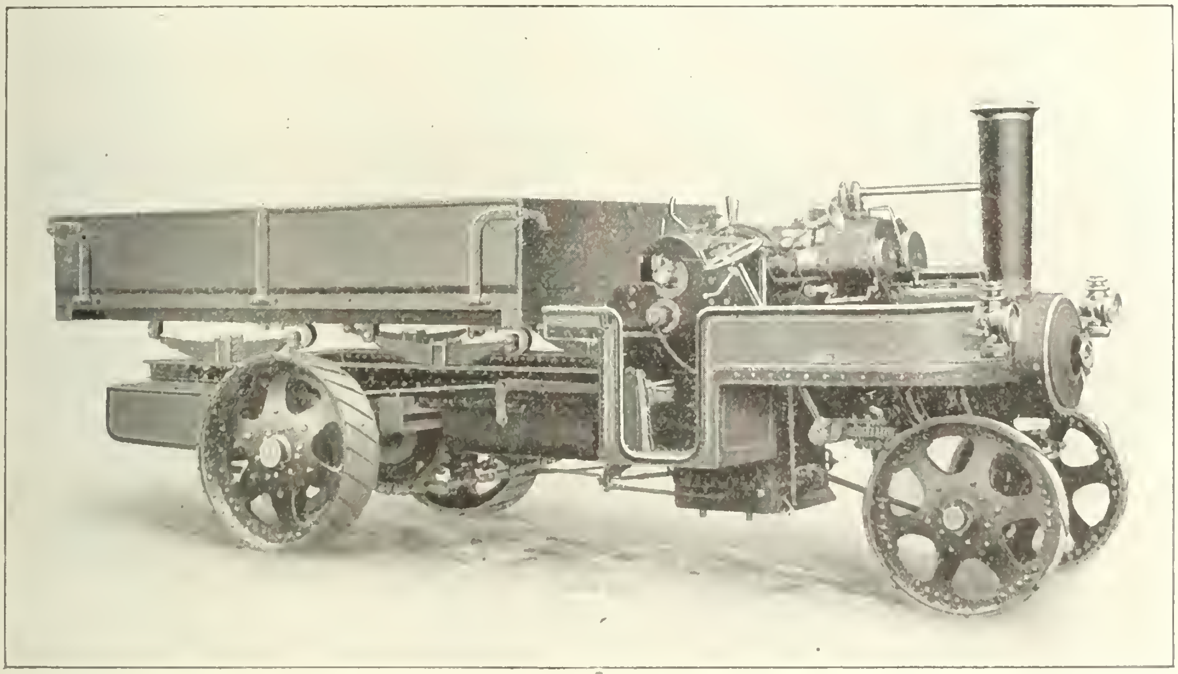

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Hoisting Apparatus
- American Hoist & Derrick Co.
- Bates & Edmonds
- Beatty & Sons, M.
- Browning Engineering Co.
- Canadian Fairbanks-Morse Co.
- Canadian Ingersoll-Rand Co.
- Doty Marine Engine & Boiler Co
- Erie Clutch & Pulley Co.
- Factory Products
- Inglis, John
- Jenckes Machine Co.
- Hopkins & Co., F. H.
- Lecky & Collis
- Marsh & Henthorn
- Mussens Limited
- Royce Limited
- Sturtevant Co., B. F.

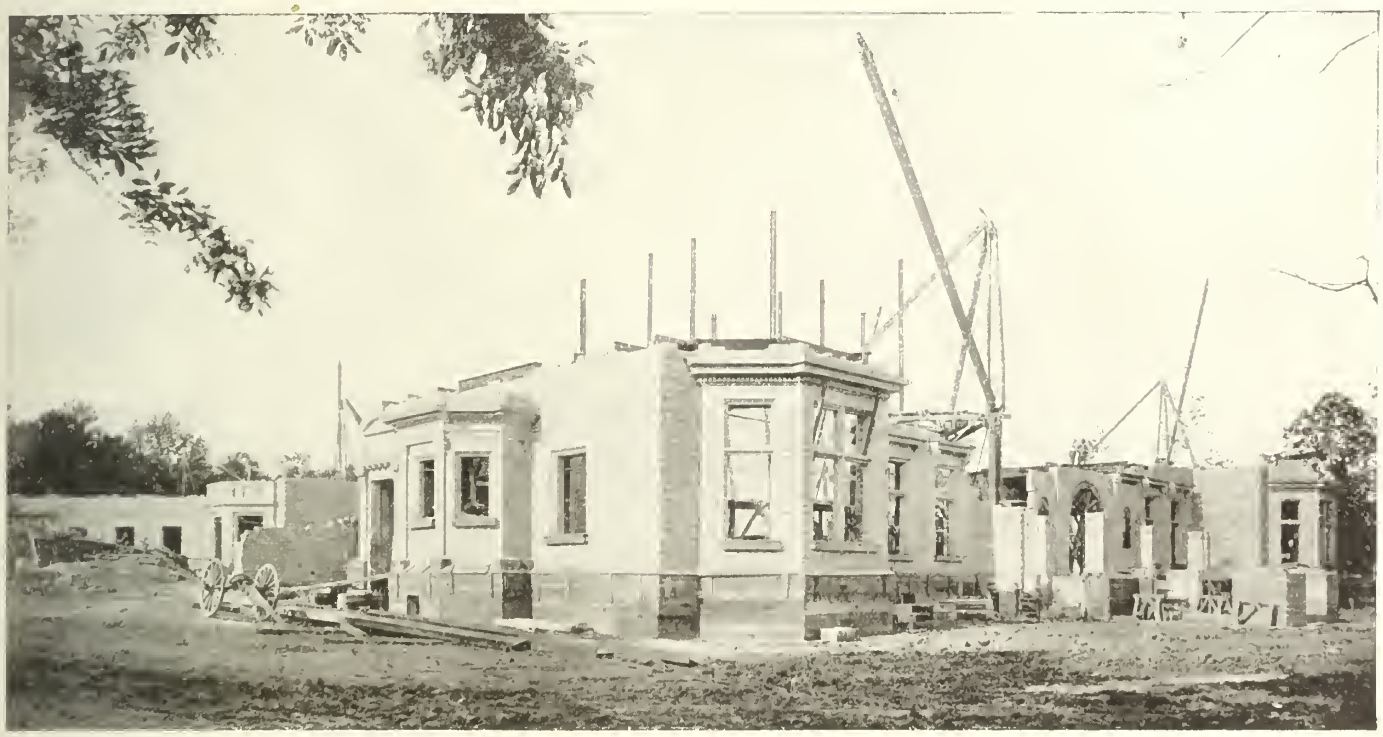
Hoisting Engines
- Canadian Fairbanks-Morse Co.

Horse Stable Fittings
- Beatty Bros.

Hydrants
- Canada Iron Corporation
- Gartshore-Thomson Pipe Co.
- Kerr Engine Co.

(Continued on page 12)

Don Valley Products



New Residence for Lieutenant Governor of Ontario, Toronto. Provincial Architect Heakes, Architect.
Don Valley Brick and Porous Terra Cotta used throughout.

Don Valley Bricks

are used in the construction of the most important public buildings erected by the Provincial Government. They are specified by the leading architects for every building of importance. The latest example of the public recognition of their superiority is found in their use for the new Toronto Residence of the Lieutenant Governor of Ontario. Don Valley Bricks possess a beauty of color and an even texture and form which add that touch of distinction to a building that characterises it as fulfilling the essentials of decorative dignity.

Don Valley Hollow Tile Fireproofing is absolutely dependable for that structural strength necessary to resist the action of age or any other deteriorating influence. For many years its success as a staple and fireproof building material has been established in hundreds of practical tests in buildings throughout the country.

"SPECIFY DON VALLEY PRODUCTS"

THE DON VALLEY BRICK WORKS

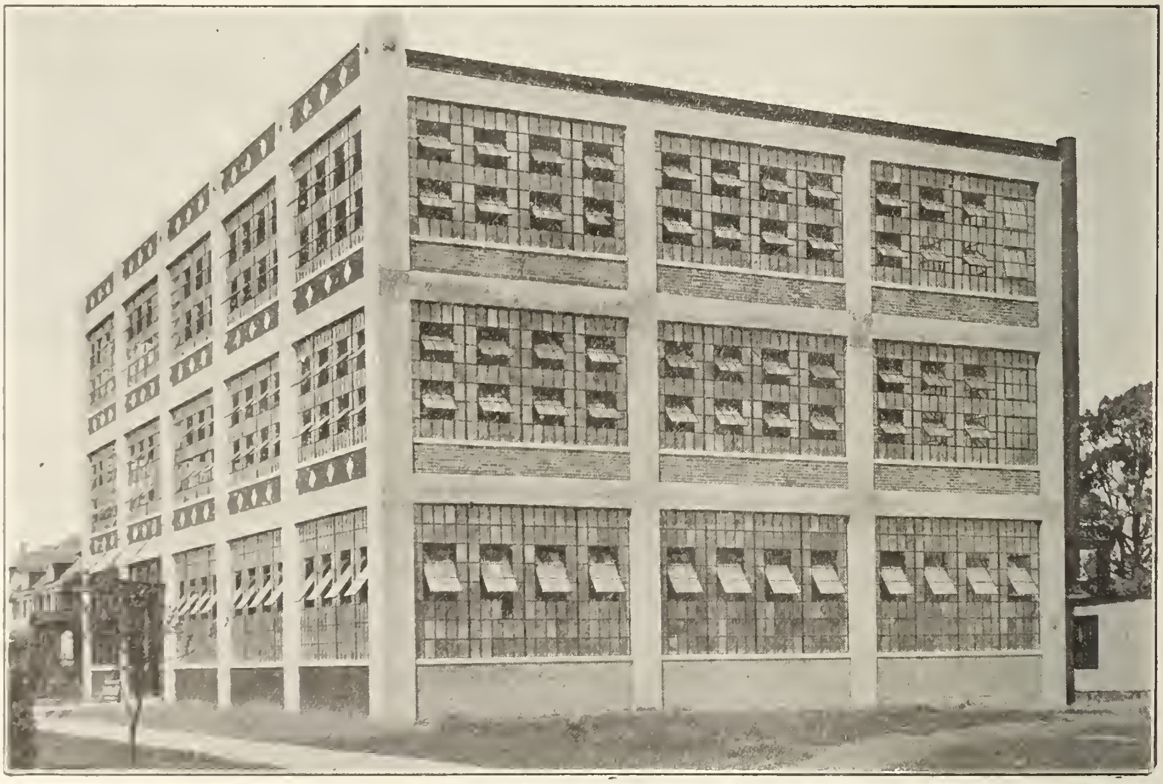
Head Office: 36 Toronto St., TORONTO
Montreal Agent: **David McGill, 83 Bleury Street**

LIGHT + VENTILATION = PROFITS

FENESTRA SOLID STEEL WINDOWS will provide your factory with an abundance of pure air; and light practically as good as that "out doors." Your employees will be able to do more and better work.

FENESTRA STEEL SASH not only increases production, but also reduces costs. Window upkeep expenses and artificial lighting bills are reduced almost to the vanishing point.

FENESTRA SASH is inexpensive compared with wooden sash, which is short lived and inflammable. It affords the minimum obstruction to light. It is attractive in appearance, strong and durable. Made to meet all conditions and sizes of window openings.



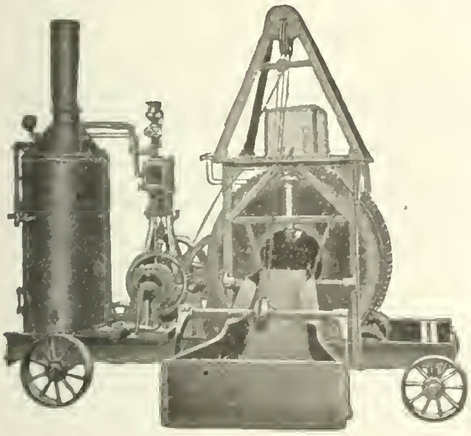
One of many buildings in Canada equipped throughout with "FENESTRA."

WRITE TO-DAY FOR CATALOG describing fully the merits of steel sash for all types of industrial buildings, large or small. FENESTRA has no equal for windows for foundries, power houses, factories, public buildings, machine shops, draughting rooms, railroad shops or any other buildings where the maximum light and ventilation are desired.

STEEL AND RADIATION, LIMITED

TORONTO, CANADA

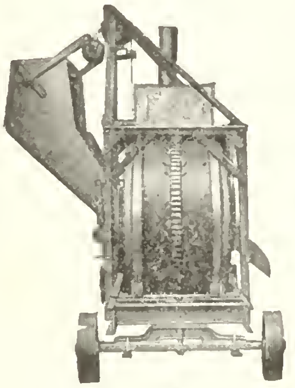
Concrete Mixers



Standard Drum Batch Mixer

SEVERAL KINDS and built in sizes to suit all classes of work.

The Many Improved features of the London Mixers have placed them in a CLASS BY THEMSELVES.



Standard Drum Batch Mixer

WE CAN SAVE THE CONTRACTORS MONEY.

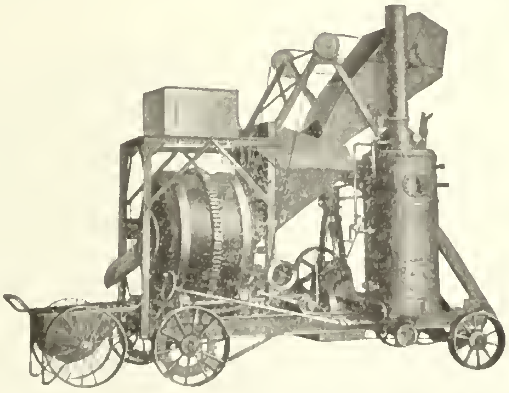
EVERY MACHINE MADE IN OUR OWN FACTORY.

On FIRST COST.

On COST OF MAINTENANCE.

On COST OF OPERATION.

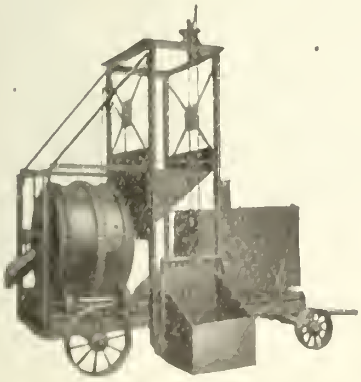
SEND FOR OUR CATALOGUE



Rear Discharge Paving Machine with Forward Loader

Our Machines are not made down to a price, but MADE UP TO A STANDARD.

By Manufacturing IN A LARGE SCALE we have been able to offer High Grade Machines AT REMARKABLY LOW PRICES.



Paving Machine with Side Loader

We manufacture a full line of Concrete Machinery and Cement Working Tools. Also a full line of Hoisting Engines and Contractors Equipment.

We are the Largest Manufacturers of Concrete Machinery in Canada.

London Automatic Batch Mixer No. 2

London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

BRANCHES:

WINNIPEG, (445 Main St.) W. H. Rosevear, Mgr.
CALGARY, (622 9th Ave. W.) P. D. McLaren, Mgr.
TORONTO (60 Richmond St. W.) F. D. Emsley, Mgr.
HALIFAX, (106 Pleasant St.) G. B. Oland, Mgr

AGENCIES:

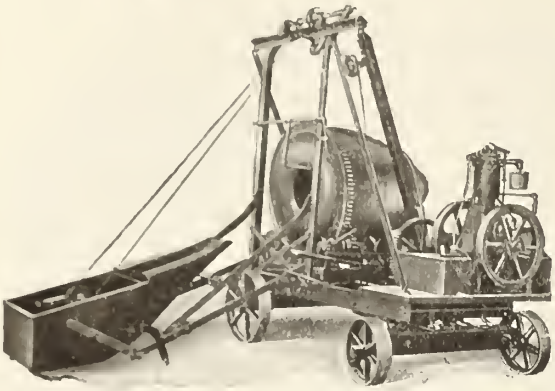
VANCOUVER, B. C. Equipment Co.,
MOOSE JAW, SASK., Bridge & Iron Co., Ltd.
REGINA, H. A. Knight
FORT WILLIAM, Northern Eng. & Supply Co.
MONTREAL, Foss & Hill Mach. Co.,
QUEBEC, Rene Talbot

For Any Rush Job

You Are Forced to Admit

that

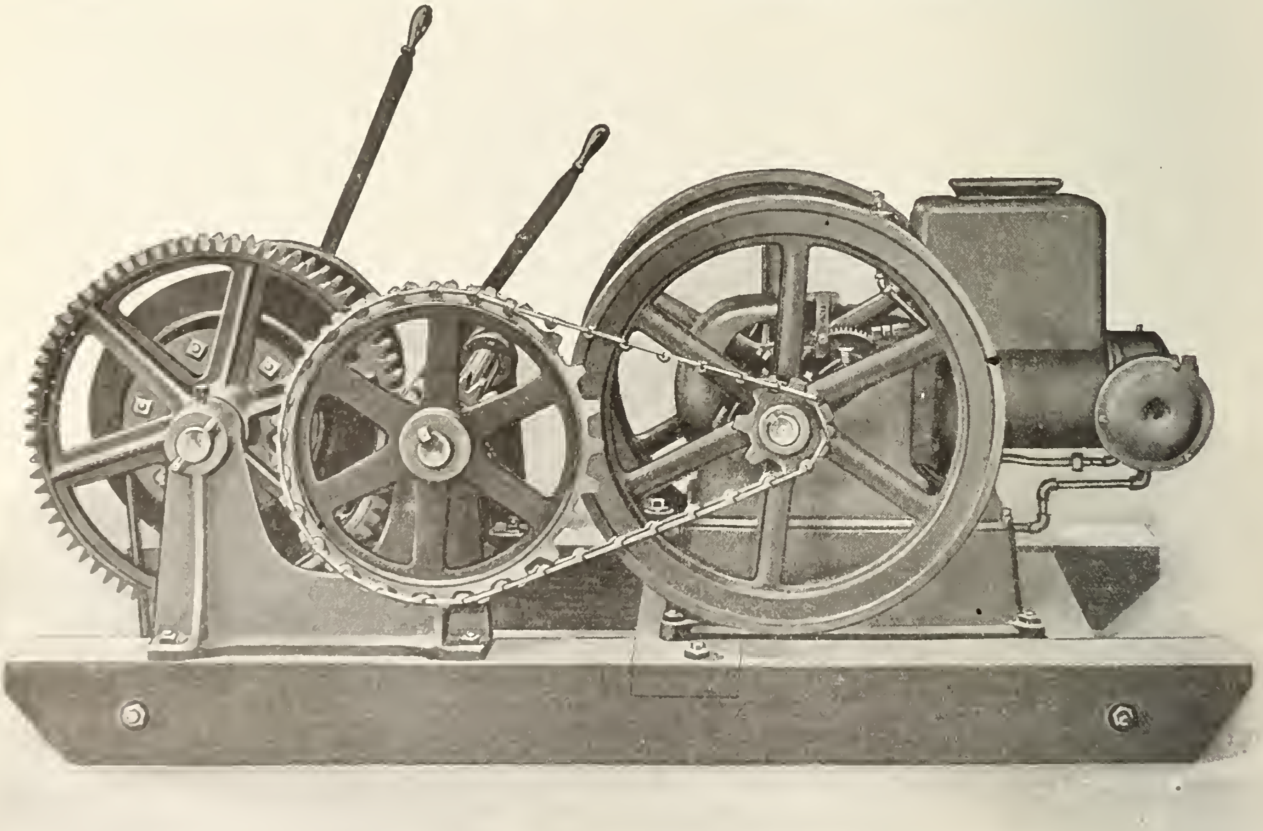
The Wettlaufer Improved Heartshape Mixer



Wettlaufer No. 1 Heartshape Mixer

will stand up to the work and see the job through with a certainty of good results that you can absolutely rely on. It will make yours a more profitable job by doing quick and perfect work with no stops for repairs.

Automatic operation—low running cost
Economical working throughout



Wettlaufer Single Drum Hoist No. 1

The most useful and complete hoist for all building and contracting purpose Its compactness size and general handiness give it great advantages over the ordinary large cumbersome hoist and enable it to be easily moved around from one part of the job to another. Its capacity for work and general utility are unlimited.

Let us send you particulars of our Hoists and Mixers—or come and see them. Continuous Demonstrations at

WETTLAUFER BROTHERS

TORONTO

FACTORIES : **Mitchell, Ont.** **Buffalo, N. Y.** **Detroit, Mich.**

AGENCIES :

A. R. Williams Machinery Co.
15 Dock St., St. John, N. B.

Lavallee Ross, Limited
Alexandra Block, Howard Ave.
Edmonton, Alta.

Hooton & Moore
613 Ashdown Block,
Winnipeg, Man.

MONTREAL OFFICE and WAREROOMS : **316 Lagauchetiere St. W.** **Head Office : TORONTO, Ont., 178 Spadina Ave.**

Steelcrete
TRADE MARK
CONSOLIDATED

WHY

Steelcrete
TRADE MARK
CONSOLIDATED

Steelcrete
TRADE MARK
CONSOLIDATED

Reinforcement is Superior to all Others

(12 REASONS)

Theoretical Considerations

(1) **It possesses a high elastic limit—not less than 55,000 lbs. per sq. in.** This is not attained at the sacrifice of quality or uniformity. "Steelcrete" is not a brittle and inferior steel but a tough, cold-drawn product with no equal in the market for uniformity of strength.

(2) **It provides against concentrated loads.** Its diamond-shaped structure enables it to distribute the effect of a sudden local load over a great many strands.

(3) **Attains a perfect bond in the concrete.** This is due to its mesh shape which does not permit any slipping and there is no possibility of it.

(4) **Perfect distribution of Steel.** Every foot of width possesses the theoretical amount of steel. The accuracy here attained is impossible in loose rod reinforcement.

(5) **Longitudinal reinforcement.** "Steelcrete" mesh possesses strength in the longitudinal direction of the pipe equal to one third the strength in the circumferential direction.

(6) **Temperature stresses are guarded against.** The form of the mesh provides a positive reinforcement against these uncertain but definite stresses.

Practical Considerations

(7) **"Steelcrete" mesh is essentially a fool-proof reinforcement.** With the use of this material the man with the brains that designs the construction obtains an efficiency of 100 per cent. with ordinary every-day inspection and unskilled labour.

(8) **"Steelcrete" Mesh is a stiff reinforcement.** It holds its position in the forms in a way that no other mesh equals. It is far more important to have the reinforcement placed correctly in a vertical direction than in the horizontal.

(9) **It is cheaper to install.** Requires less labour than any other mesh or system of rods.

(10) **It is easy of inspection.** Only those who know "Steelcrete" know the trouble, delay and anxiety this saves to both contractor and engineer alike.

(11) **It can be placed quickly.** This means a saving in overhead charges. This feature has been overlooked by a great many engineers and architects in the past.

(12) **ALFRED ROGERS IS NOW CARRYING IN STOCK HALF MILLION SQUARE FEET OF "STEELCRETE" FOR IMMEDIATE DELIVERY.**

ROGERS

Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

ROGERS

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery—Send us your orders for crushed stone.

ROGERS

French Caen Stone Cement

Monarque Brand and Cementa-line. Rich in appearance and of unlimited durability—as good as natural stone—but cheaper. Full particulars on request.

Quotations made for all Work—Prompt Deliveries and Complete Shipments given from Stock

Alfred Rogers Limited

28 King St. West **Toronto, Ontario.**

Western Sales Manager
W. J. DINNEN & CO., Winnipeg, Man.

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  Toronto Furnace Co.

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  Canadian Mineral Rubber Co.
  Standard Underground Cable Co. of Canada, Limited

Interior Finish and Doors
  Batts Limited
  Canada Office & School Fur. Co.
  Oshawa Int. Fittings Co.
  Rhodes Curry & Co.

Kilns
  Canadian Buffalo Forge Co.
  Sheldons Limited
  Sturtevant Co., B. F.

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  Christie, Henderson & Co.
  Jamieson Lime Co.
  Ontario Lime Association

Lime Kilns
  Improved Equipment Co.

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  Canadian Boving Co.
  Montreal Locomotive Works
  Canada Foundry Co.

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  Lautz Company
  Mississquoi Marble Co.

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  Metallic Roofing Co.
  Noble, C. W.
  Steel & Radiation Ltd.

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  Hotchkiss Lock Metal Form Co.

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  Hopkins & Co., F. H.
  McDougall Caledonian Iron Wks
  Neptune Meter Co.
  Union Water Meter Co.

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  Garlock Packing Co.

Paints (Bridge and Structural Iron and Pipe Coating)
  Canadian Mineral Rubber Co.

Paints and Varnishes
  Billings Chapin Co.
  Elatcrite Paint Co.
  Pinchin, Johnson & Co.
  R.I.W. Damp Resisting Paint Co.

Paving Cement
  Canadian Mineral Rubber Co.

Paving and Paving Materials
  Dominion Creosoting Company
  Metropolitan Paving Brick Co.
  Ontario Asphalt Block Co.
  Paterson Mfg. Co.

Perforated Metals
  Canada Wire & Iron Goods Co.
  Greening Wire Co., B.

Pipe (Concrete, Iron and Wood)
  American Spiral Pipe Works
  Canadian Pipe Co.
  Dominion Concrete Co.
  Gartshore-Thomson Pipe Co.
  Munderloh & Co.
  National Iron Works
  National Pipe & Foundry Co.
  Pacific Coast Pipe Co.
  Piggott & Co., Thos.

Pile Driving Machinery
  American Hoist & Derrick Co.
  Browning Engineering Co.
  Canadian Ingersoll-Rand Co.
  Lecky & Collis
  Vulcan Iron Works

Planing Mill Exhausters
  Canadian Buffalo Forge Co.
  Sheldons Limited

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  Alabastine Co.
  Albert Mfg. Co.
  Britnell & Co.
  Crown Gypsum Company

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  Canadian Ingersoll-Rand Co.

Plumbers' Supplies
  Standard Ideal Co.

Pneumatic Machinery
  Canadian Ingersoll-Rand Co.

Portable Saws
  Canadian Fairbanks-Morse Co.

Power Engines
  Inglis Company, John

Pumps and Pumping Machinery
  Bates & Edmonds
  Beatty & Sons, M.
  Canada Foundry Co.
  Canadian Boving Co.
  Canadian Buffalo Forge Co.
  Canadian Fairbanks-Morse Co.
  Canadian Ingersoll-Rand Co.
  Cook, A. D.
  Escher Wyss & Co.
  General Supply Co.
  Hamilton Mfg. Co., Wm.
  Hopkins & Co., F. H.
  Inglis & Co., John
  McDougall Caledonian Iron Wks.
  Smart-Turner Machine Co.
  Thomas & Smith
  Waterous Engine Works Co.
  Mussens Limited
  Ontario Wind Eng. & Pump Co.

Quarry Machinery
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  Improved Equipment Co.
  Lecky & Collis
  George Anderson & Co.

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  Gartshore, John J.
  Hopkins & Co., F. H.
  Mussens Limited

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  Linde British Refrigeration Co.

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  Ambursen Hydraulic Cons. Co.
  Canada Steel Co., Ltd.
  Canada Wire & Iron Goods Co.
  Factory Products
  Greening Wire Co., B.
  Leach Contracting Co.
  Steel Co. of Canada
  Steel & Radiation Ltd.
  Trussed Concrete Steel Co.
  Turner, C. A. P.

Revolving Stone Screens
  Greening Wire Co., B.

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  Canadian Mineral Rubber Co.

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  Erie Machine Shops
  Huber Manufacturing Co.
  Lecky & Collis
  Morrison & Co., T. A.
  Mussens Limited
  Waterous Engine Works Co.
  Western Wheeled Scraper Co.

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  Asbestos Mfg. Co.
  Brantford Roofing Co.
  Can. H. W. Johns-Manville Co.
  Canadian Mineral Rubber Co.
  Canadian Supply Company
  Metallic Roofing Co.
  Noble, Clarence W.
  Paterson Mfg. Co.

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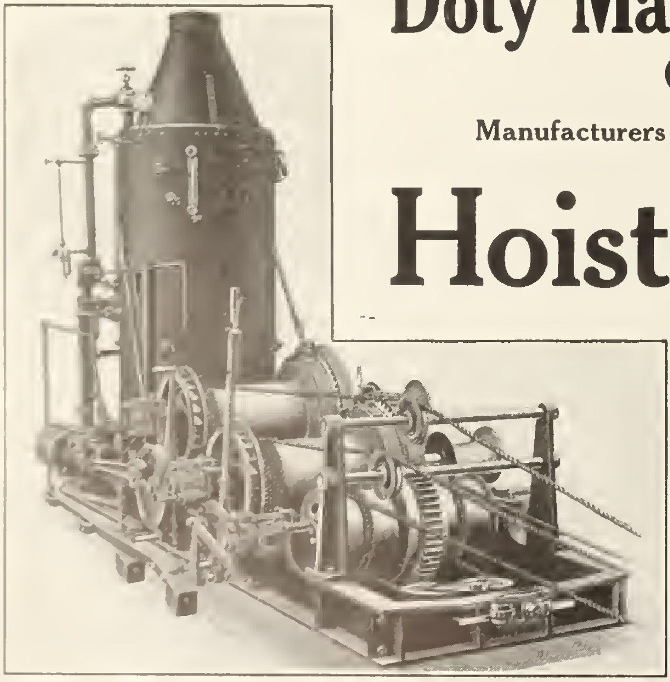
The

Doty Marine Engine & Boiler Company Limited

Manufacturers of **Superior**

Hoisting Engines



This cut illustrated our Standard Double Cylinder Double Drum Hoisting Engine with Derrick Swinger attached. "Superior to any other on the market." All parts constructed, guages and templates and every engine tested under steam.

Derrick Swingers, Material Elevators, etc.

for

Contractors, Mines and Quarrymen

A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

Works—GODERICH, ONT.

To buy our Engines is a Guarantee of Satisfaction

Sawyer Belt will stand any weather

Exposure is the cause of many belting troubles. Neither leather or rubber belting, though expensive will stand both rain and shine.

Here is where **Sawyer Canvas Stitched Belt** shows its superiority. The compound in which it is immersed renders it pliable under all conditions.

It costs less—It wears more.

Try it in rain or shine

Sawyer Belting Co.
Cleveland, Ohio

THE STRENGTH OF OAK WITH 40 PER CENT SAVING IN WEIGHT

That's the saving effected by constructing the bed of selected Washington Fir, and its just one of the many reasons why lightest weight is combined with greatest strength in the

"Aurora" Dump Waggon

Built low for easy loading, coupled short for lightest draft only 7 feet 4 inch wheel base.

Chains entirely outside of bed, direct pull of chain on doors and length of chains adjustable.

Slotted hinges on doors give vertical movement, preventing installing team on dump.

Study its sturdy construction—its mechanical, labor-saving and dependable qualities. Catalog for the asking.

Western Wheeled Scraper Co.
AURORA, ILL.

Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902

Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS	1903	$ 0.00	1908	$ 93.26
	1904	3.30	1909	200.46
	1905	9.35	1910	14.07
	1906	37.33	1911	2.29
	1907	16.11		

Total $376.17 or 5⅔c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.
Hagersville, Ont. Limited

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  Goodyear Tire & Rubber Co.

Safes and Vaults
  Taylor, J. & J.

Sand and Gravel
  National Sand and Material Co.
  Sand and Supplies Ltd.
  York Sand and Gravel Co.

Screens
  Canada Wire & Iron Goods Co.
  Greening Wire Mfg. Co., B.

Sewer Joint Asphalt
  Canadian Mineral Rubber Co.

Sewer Pipe
  Britnell & Co.
  Canada Iron Corporation
  Dominion Sewer Pipe Co.
  Gartshore Thomson Pipe Co.
  National Iron Works
  Ontario Sewer Pipe Co.
  Smyth & Ryan
  Standard Drain Pipe Co.

Sewer Trenching
  Austin Drainage Excavator Co.
  Lecky & Collis
  Mun. Engineering & Contracting Company

Sound Deadening
  Cabot Inc., Samuel

Shovels (Steam)
  Browning Engineering Co.
  Beatty & Sons, M.
  Canada Foundry Co., F. H.
  Hopkins & Co., F. H.
  Montreal Locomotive Works
  Mussens Limited
  Thew Automatic Shovel Co.
  Willis Shaw Mach. Co.

Shovels
  Lundy Shovel & Tool Co.

Smoke Stacks
  Des Moines Bridge Co.
  Hamilton Mfg. Co., Wm.

Stains, Shingle, Cement & Brick
  Cabot, Inc., Samuel
  Pinchin, Johnson & Co.

Steam Apparatus
  Canadian Buffalo Forge Co.
  Sheldons Limited
  Sturtevant Co., B. F.

Steam Turbines
  McDougall Caledonian Iron Wks.

Steel
  Canada Steel Co., Ltd.
  Dominion Steel Castings Co.
  Lecky & Collis
  Provincial Steel Co.

Steel Bars
  Canada Steel Co., Ltd.
  Factory Products
  Steel Co. of Canada.
  Steel & Radiation, Ltd.

Stone
  Britnell & Co.
  Brodie, Jas.
  Christie, Henderson & Co.
  Consolidated Stone Co.
  Contractors' Supply Co.
  Corinthian Stone Co.
  Crushed Stone, Limited
  Hagerville Contracting Co.
  Mahan & Company
  McMillan & Son, W.
  Morrison & Co., T. A.
  Myers, Oakley
  Queenstown Quarry Co.
  Rogers Supply Co.
  Roman Stone Co.
  Sackville Freestone Co.
  Sand & Supplies
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Stone Saws
  Anderson, Geo.

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  Canada Steel Co.
  DesMoines Bridge Co.
  Dominion Bridge Co.
  Factory Products
  Dominion Steel Castings Co.
  Hamilton Bridge Works Co.
  Mackinnon Holmes & Co.
  McNeil & Co., W. P.
  Phoenix Bridge & Iron Works
  Provincial Steel Company
  Reid & Brown
  Sarnia Bridge Company
  Steel Co. of Canada
  Structural Steel Co.
  Standard Steel Construction Co

Submarine Drills
  Canadian Mineral Rubber Co.
  Lecky & Collis

Swinging Gears
  Dake Engine Company

Tanks and Stand Pipes
  Berg Machinery Co.
  Des Moines Bridge Co.
  Hamilton Mfg. Co., Wm.
  Inglis, John
  Jenckes Machine Co.
  Marsh & Henthorn
  McDougall Caledonian Iron Wks
  Ontario Wind Eng. & Pump Co.
  Piggott & Co., Thos.

Tents
  Turner & Sons, J. J.
  Woods Limited
  Waterous Engine Works Co.

Testing and Inspecting Bureau
  Hunt & Co., Robt. W.

Valves
  Canada Iron Corporation
  Gartshore-Thomson Pipe Co.
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Ventilating & Heating Apparatus
  Canadian Buffalo Forge Co.
  Sheldons Limited
  Sturtevant Co., B. F.

Varnishes—Insulating
  Standard Underground Cable C
  of Canada, Limited

Veterinary Remedies
  Johnson, A. H.

Waterproofing
  Billings Chapin Co.
  Cabot Inc., Samuel
  Can. H. M. Johns-Manville Co.
  Canadian Mineral Rubber Co.
  Ceresit Waterproofing Co.
  Chillas-Black
  Elaterite Paint Co.
  Pinchin, Johnson & Co.

Water Softeners and Filters
  American Water Softener

Water Turbines
  Canadian Boving Co.
  Escher Wyss & Co.
  Hamilton Mfg. Co., Wm.
  McDougall Caledonian Iron Wks.

Wire
  Canada Wire & Cable Co.
  Factory Products
  Standard Underground Cable Co.
  of Canada, Limited

Wires and Cables
  Royce Limited

Wire Guards and Screens
  Canada Wire & Iron Goods Co.
  Greening Wire Co., B.

Wire Rope
  Canada Wire & Cable Co.
  Greening Wire Co., B.
  Smith, Thos. & Wm.
  Steel Co. of Canada

Wood Turnings
  Automatic Wood Box & Turning Company

"PIONEER" ASPHALTS

"PIONEER" Highest Quality ASPHALTS
TRADE MARK

The 16 year record of "PIONEER" ASPHALTS is the best assurance an Engineer can have as to their efficiency, permanency and economy. Specify "PIONEER" ASPHALTS

For Asphalt Macadam Roads, Asphaltic Concrete, Sheet Asphalt Paving—and Filler for Brick and Block Pavements

and results will be highly satisfactory. "PIONEER" ASPHALTS are 99.5 per cent. pure bitumen. They are waterproof and weatherproof. Can be used for all purposes where an asphalt can be used.

Write for Specifications

THE CANADIAN MINERAL RUBBER CO., Ltd.
Canadian Express Building, MONTREAL
503 Canada Building, WINNIPEG

Tarvia

Preserves Roads
Prevents Dust~

Country Club Road, Greenville, S.C. Built with Tarvia X

What the Goverment

Found Out About Tarvia

The Office of Good Roads, U. S. Department of Agriculture, built an experimental road at the country club at Greenville, S. C., in 1909, following very closely our specifications for two-coat penetration work, using "Tarvia X."

After two years the above photo of the road was taken at a point where it adjoins a stretch of plain macadam. The intention of the Department was to find out just how much difference the tarvia treatment made.

The picture tells the story. The plain macadam in the foreground is **worn out.** The tarviated surface is in **perfect condition** and the difference is so great that a clear division line is seen in the above photograph.

This is a typical instance of the success of Tarvia as a road binder. A tarviated road is automobile proof, waterproof, dustless and mudless. It is so much cheaper to maintain that the cost of using Tarvia in the construction is more than compensated for.

Tarvia is made in three grades.

"Tarvia X" for use in constructing roads and pavements.

"Tarvia A" for hot surface applications.

"Tarvia B" (applied cold) for dust prevention and road preservation

Tarvia booklet mailed free to anyone interested. Address our nearest office.

THE PATERSON MANUFACTURING CO., Limited

MONTREAL TORONTO WINNIPEG VANCOUVER

The Carritte-Paterson Manufacturing Co., Limited, St. John, N.B., Halifax, N.S.

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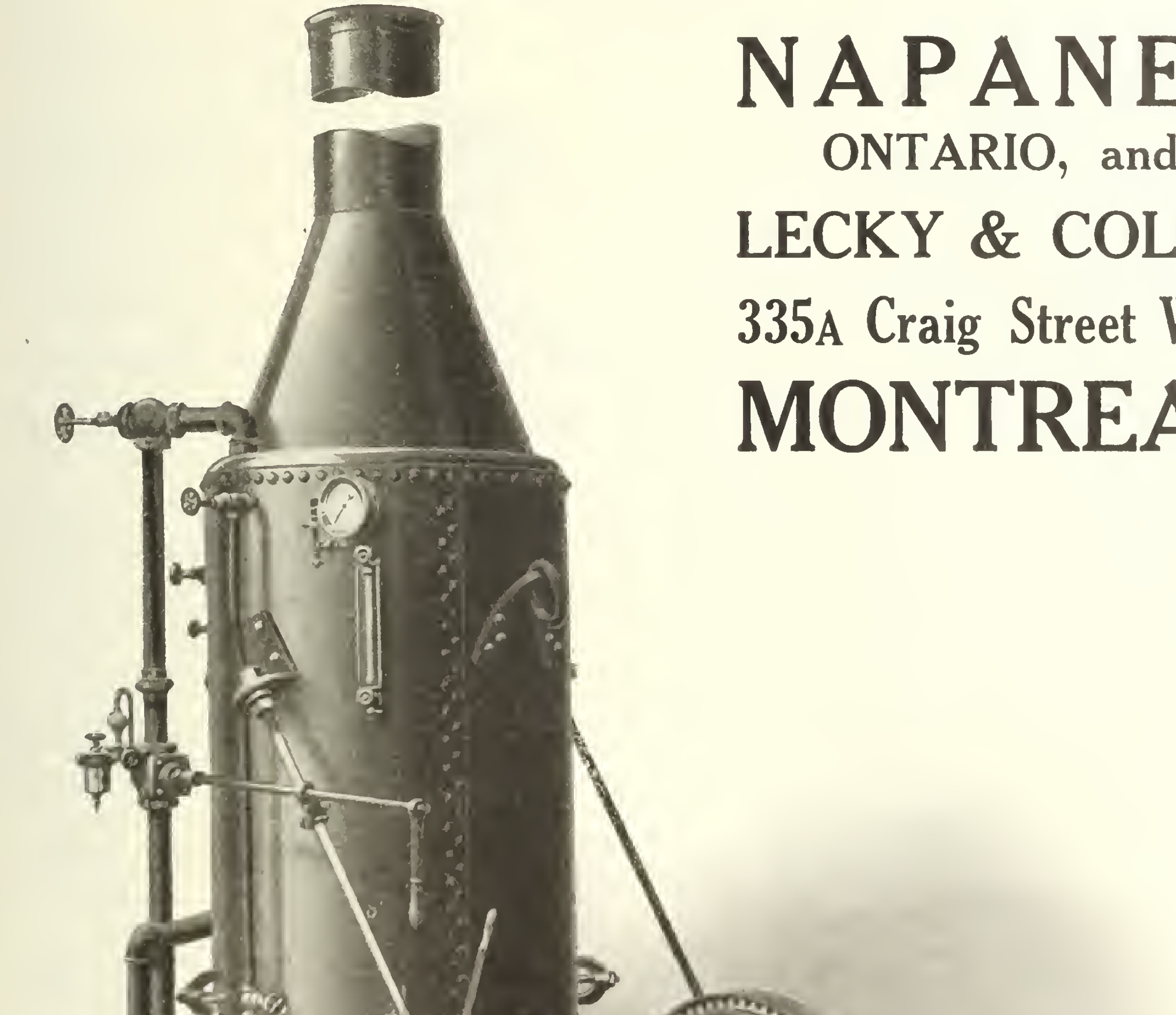

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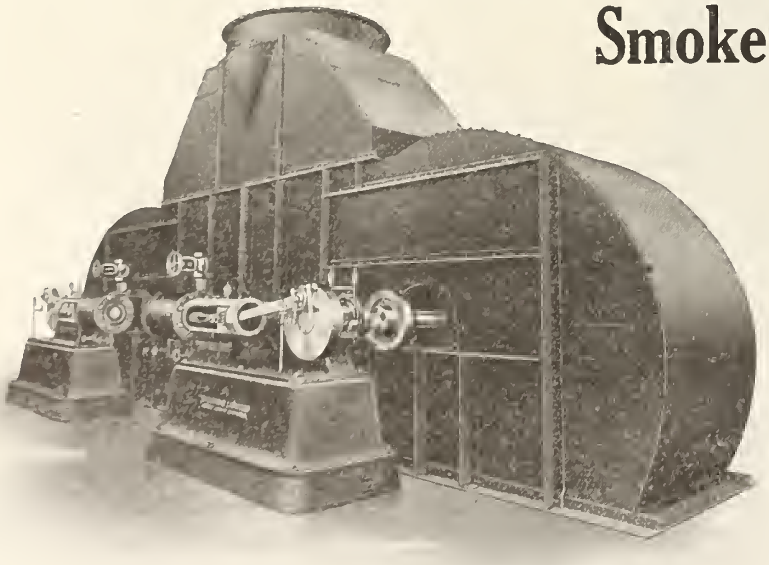

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"CEMENT FILLER" and "CEMENT FLOOR PAINT"

TOCH BROTHERS
ESTABLISHED 1848

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For application to the inner surface of exterior brick or masonry walls, above grade level. Prevents the penetration of dampness. Saves the cost of furring and lathing.

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For use on cement floors in hospitals, laboratories, engine rooms, factories, etc. Will prevent cement floors from dusting up, also renders them oil-proof and water-proof.

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True to Size.
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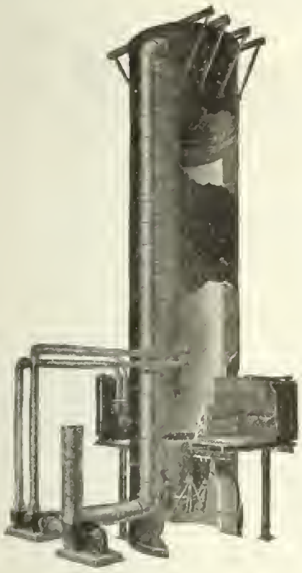
Is Your Lime As Good As It Can Be Made?



The best way to command a market is to supply the best product offered in your line. Buyers won't haggle over prices if they know the quality is right.

With a Doherty Lime Kiln you can make the very best lime it is possible to manufacture — a lime that the trade will soon come to know and demand.

The explanation is that a Doherty Kiln is not a cheap makeshift, but a scientifically designed, economical lime-making machine.

It uses heat that other kilns waste—and uses it in such a way that the lime is never over-burned or under-burned, but is always just right.

Bulletin No. 4—sent on request may open the doors of a larger market for you.

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Muffle Furnaces	Gas Producers
Complete Gas Plants	Refractory Materials
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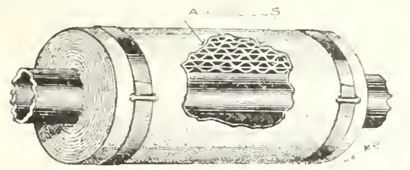

Heat cannot pass through dead or motionless air.

The ordinary air cell coverings used for heating work **confine live air** and **not motionless air**—they have large air spaces running from end to end which allow air to travel back and forth. Therefore they do not prevent the loss of any great amount of heat any more than you could keep heat from escaping from a pipe or a radiator in a room by closing all the doors, windows and vents.

J-M ASBESTOCEL

is made on a different principle from all others. The air cells run around the pipe instead of lengthwise. This makes the air spaces so small that there is no place for the air to circulate, and it must be motionless—dead. Consequently, **J-M ASBESTOCEL** confines a much larger volume of dead air than any other low pressure covering does.

If you have hot water or low or medium pressure steam pipes to insulate, compare J-M ASBESTOCEL with all others. You can quickly see that it contains the greatest number of dead air spaces.

Write Nearest Branch for Sample and Catalog No. 100.

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Manufacturers of Asbestos and Magnesia Products

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Asbestos Roofings, Packings, Electrical Supplies, Etc.

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- **SMOKE BOXES and STACKS**
- **STEEL PLATE TANKS for any purpose**

We make a specialty of tanks that must be water, oil, or air tight, or that are to be built to meet special or difficult requirements.

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For Limestone, Marble and Sandstone

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SOLE MAKERS
Office: 86 NOTRE DAME ST. WEST,
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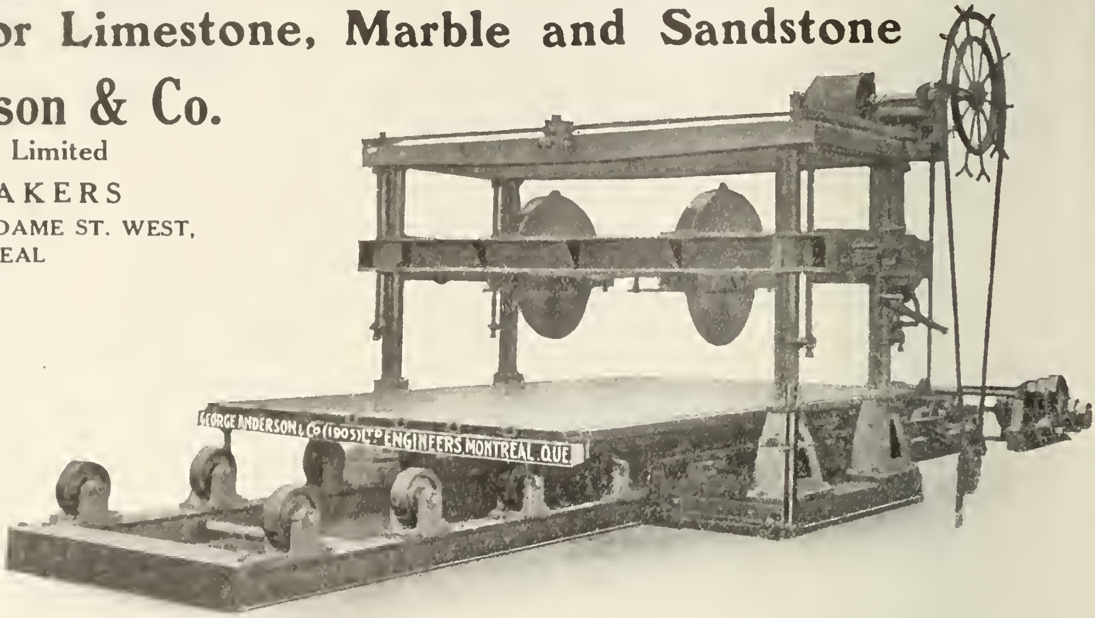

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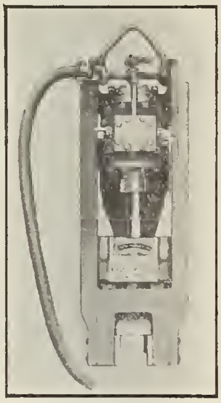

It is the quickest acting Hammer on the market and strikes the heaviest blow.

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17 City Engineers

tell their good opinions about "Canton" Shale Paving Brick in a Booklet

"What Experts say about Metropolitan Paving Brick"

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"Best Paving Block Made"

"Metropolitan Block" Make Permanent Pavements

The Metropolitan Paving Brick Co. - - - Canton, Ohio, U.S.A.

Save Time, Trouble and Money

By Using a

THEW SHOVEL

for that EXCAVATING CONTRACT

The contractor with men and teams cannot compete successfully with the man who owns a THEW SHOVEL.

THE REASON WHY

The smallest Thew does the work of from twenty to forty men at one-third of the cost. The Thew, being able to load a wagon a minute, will often save enough in team time to pay its entire operating cost, which means that you are loading dirt for practically nothing. Hand labor is difficult to secure, hard to hold and inefficient in practice, while the Thew is always on the job.

It will pay you to investigate this shovel. Write for our catalog, C. R. It will explain the numerous features which make the Thew the most practical and economical machine of its kind on the market and will give you valuable information regarding cost of excavating.

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12 to 72 inches Diameter

Used extensively for Water Supply for Mines, Mills, Hydraulic Operations and High Pressure Hydro Electric Installations.
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MANUFACTURERS OF

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FORGED STEEL FLANGES

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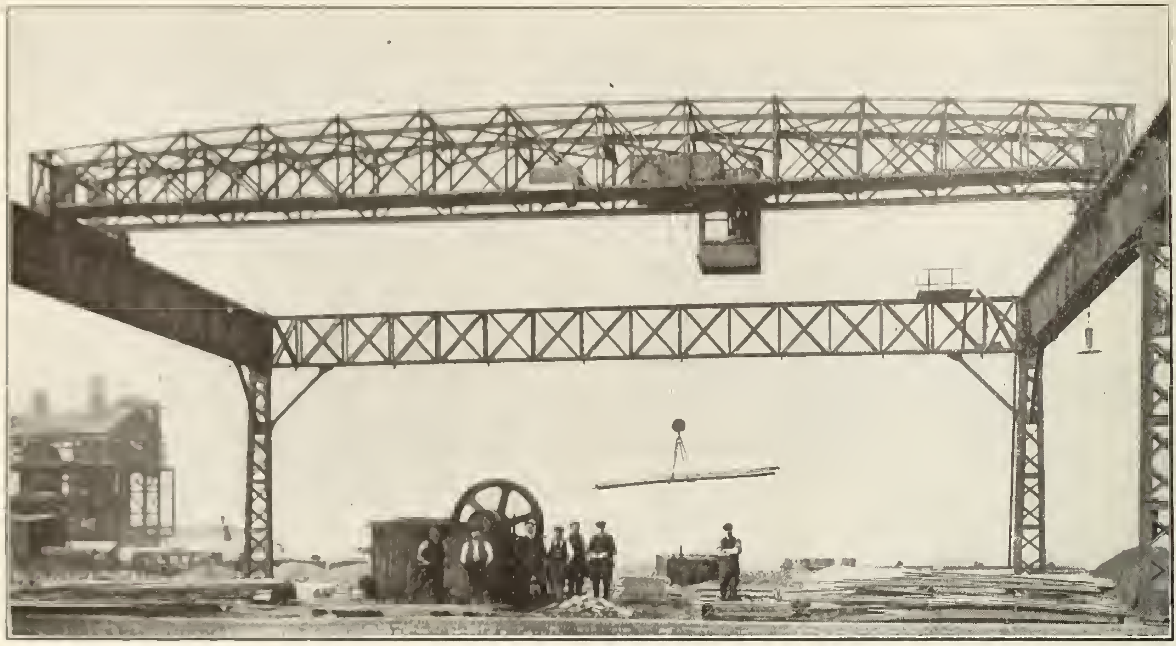

Yard Crane at Steel Mill of Sir Alfred Hickman, Limited, Bilston, Staffordshire

Royce
Electrical
Cranes
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Include
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Crane Type
Motors,
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CRANES TELFERS CAPSTANS WINCHES

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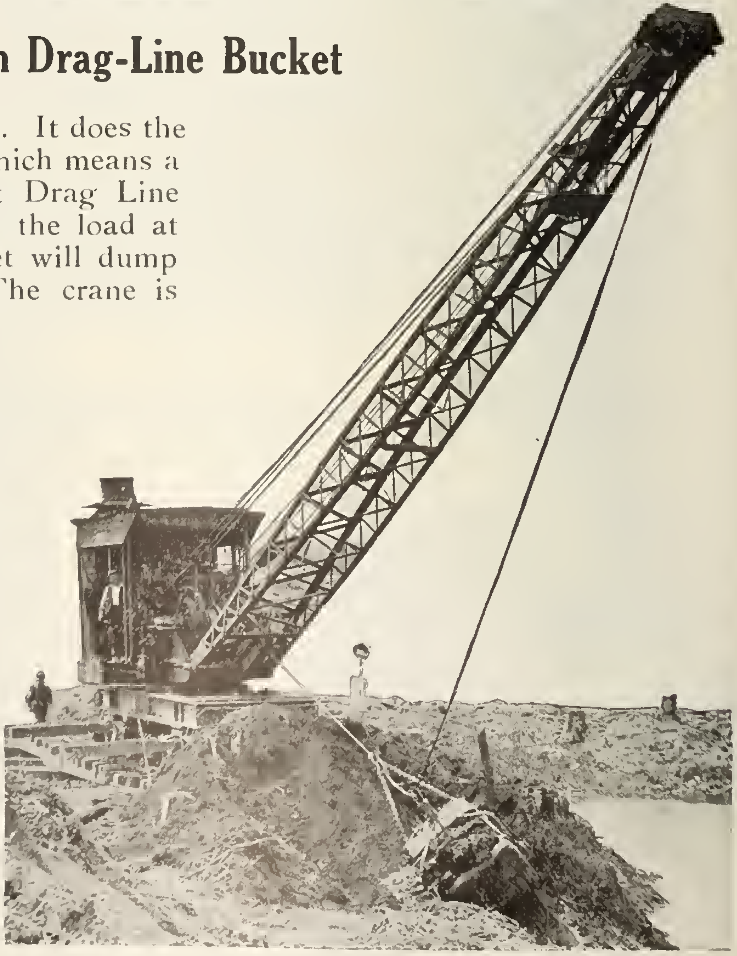

Brownhoist Locomotive Crane With Drag-Line Bucket

is being used today on large excavating jobs. It does the work rapidly and with only a few men—which means a low cost per yard. With the Brownhoist Drag Line Bucket the operator of the crane can dump the load at any point along the boom—or the bucket will dump automatically at the end of the boom. The crane is shown here on the New York Barge Canal.

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Records show where the crane has been used day and night for months at a time without stopping for repairs. This appeals to contractors because loss of time is expensive.

We furnish this equipment up to 100 ft. booms and 3½ yd. bucket.

Write for detail information.

The Brown
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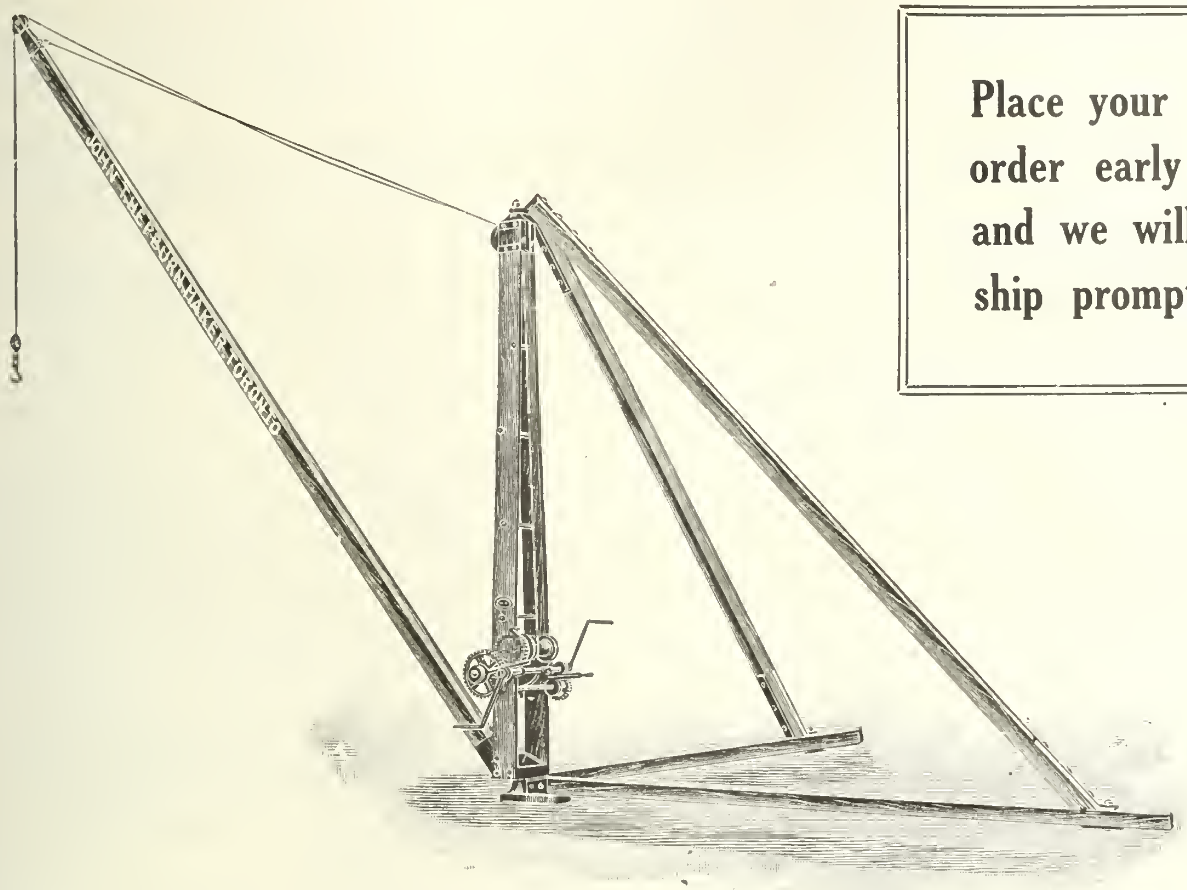
Place your order early and we will ship promptly.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The Proved Economy of Hepburn Scotch Derricks

If you cut the time upon a job and still do the job right, you are time and money in pocket. When you reduce labor by better methods and better equipment you also save time—and save money. You can get through more work, in less time, and at a better profit.

Hepburn Derricks represent bed-rock economy in construction work equipment.

They have weight where weight is needed. They have great strength. Yet every part is so well proportioned, so accurately and staunchly built, that a Hepburn Derrick is more easily operated and will do more work than any other derrick on the market.

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Made in standard sizes—one-half ton upwards. Interchangeable parts kept in stock for prompt shipment. Operated by hand or power. Fitted with single and double-purchase gears, band brake, and high-grade wire heaving rope. Interchangeable parts always in stock.

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We make
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30 " " "
40 " " "
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300 Tons 30 lb. Rails ready for Shipment

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40 " "
60 " Angle Bars
80 " " "

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	3/8 to 2-in.	3/4 x 1/8 to 4 x 1	3/4 x 1/8 to 2 1/2 x 1/2

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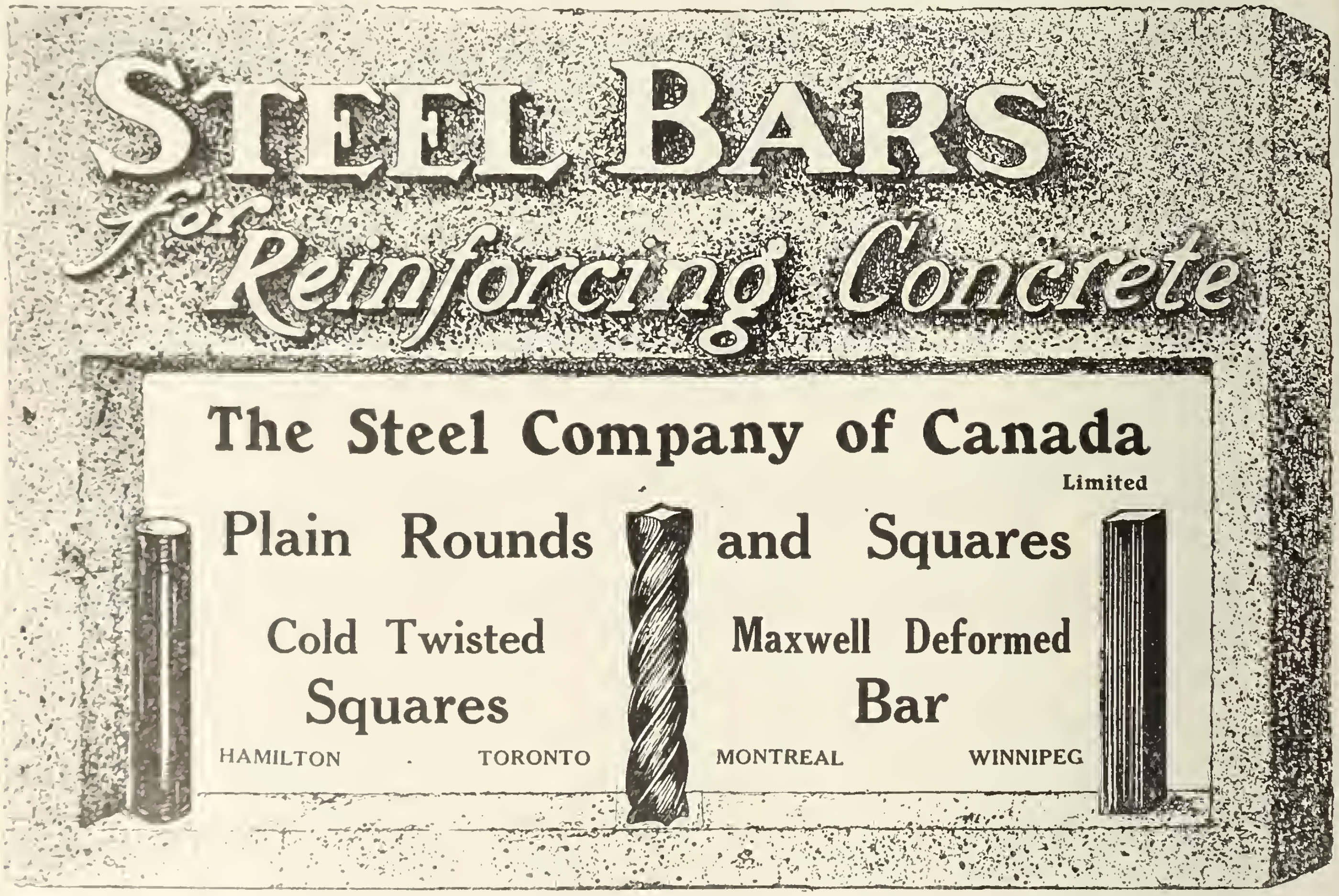

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Plain Rounds and Squares

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For Reinforcing Concrete

Plain Rounds

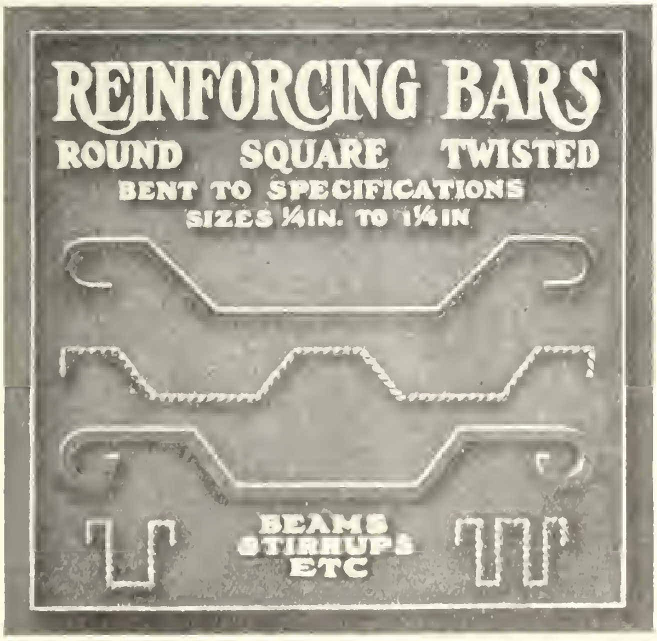
Squares

Twisted Squares

Cross Arm Braces, Plain and Galvanized.

We can ship from stock

Ask for prices—they will interest you.



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Angles from ¾ x ¾ in. up to 2 x 2 ins.

Round and square from ⅜ in. up to 1¼ ins.

Flats from ¾ in. up to 4 ins. in width, and other special sections.

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For VENTILATING and COOLING

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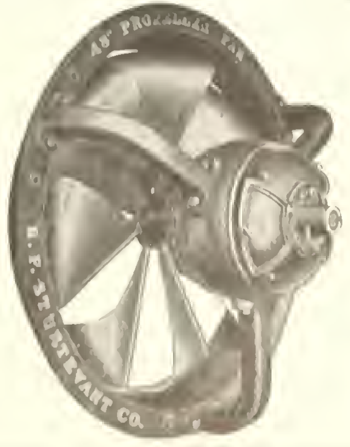
They will quickly change the air in factories, workrooms, kitchens, billiard halls, etc., carrying away the smoke, fumes, hot air, keeping the atmosphere sweet and cool.

The electric fans are equipped with motors wound for either alternating or direct current. *Ask for Bulletin No.* 146 Z.



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Reduce
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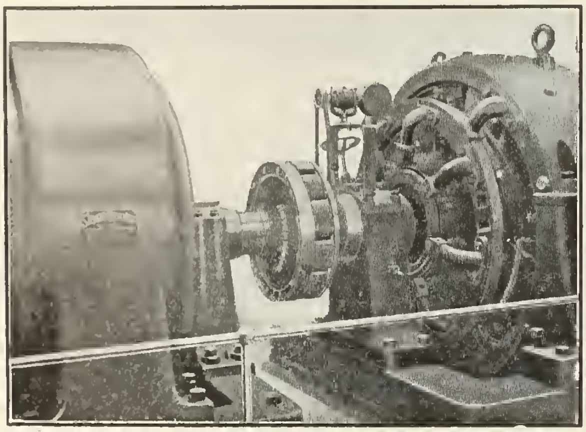

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Centrifugal Pumps
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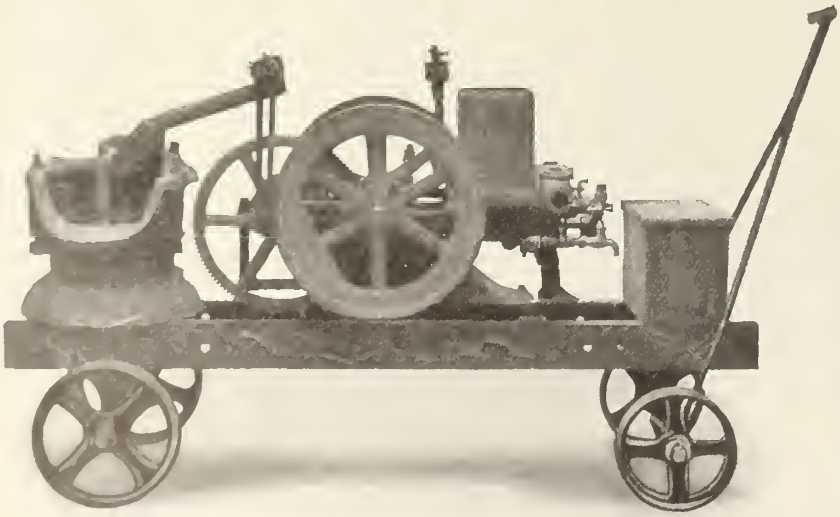

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CAPACITY 3″ SUCTION		COST OF OPERATION
3,500 gallons	per hour	2 cents
35,000 "	" day	20 "

Let us demonstrate this to you.

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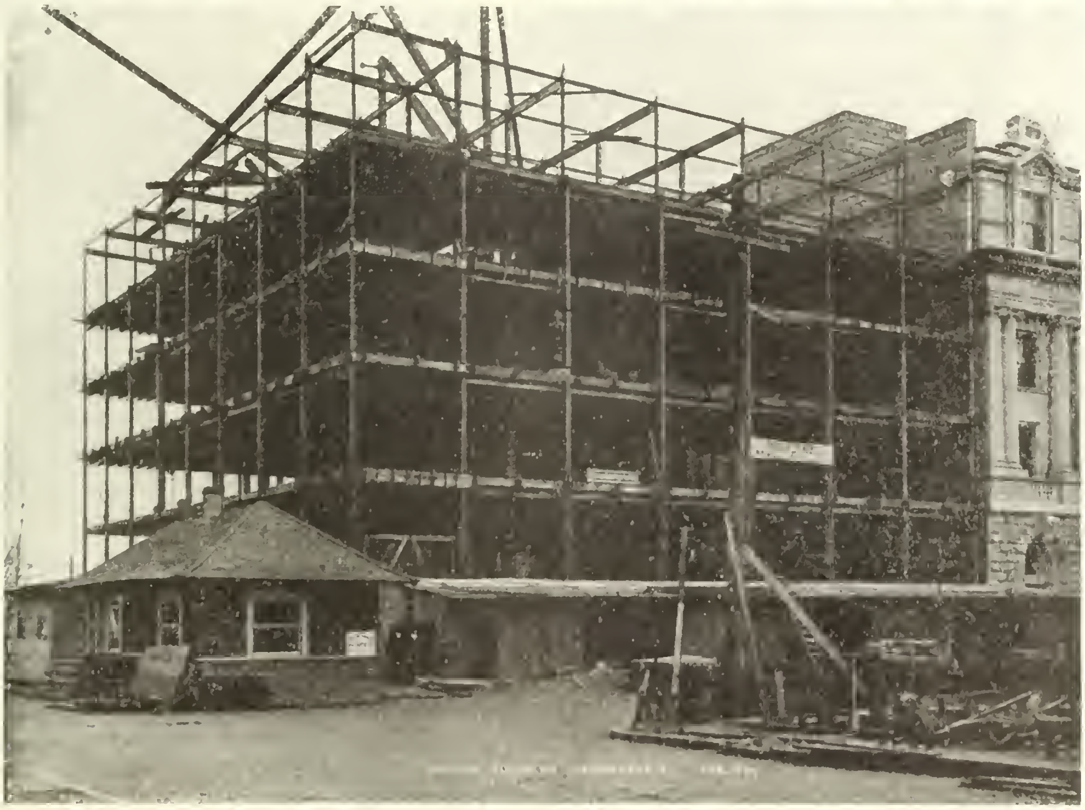
TRIANGLE MESH
CONCRETE REINFORCEMENT



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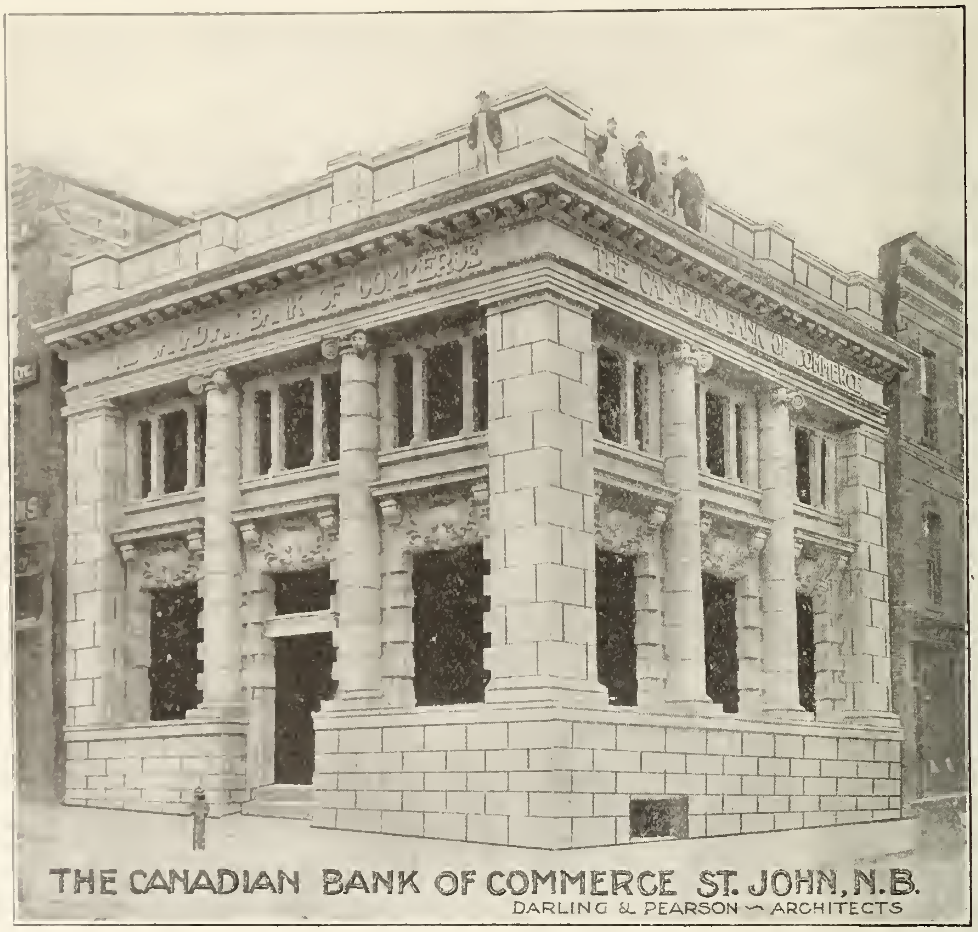

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It is built up, layer upon layer, of close-woven, long-fibre, cotton fabric, rubberized and cured under Goodyear processes. And every Goodyear belt has in it the lowest possible minimum of stretch, because the belt is "cured" whilst stretched to the limit of safety in a special machine.

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And the result is entirely satisfactory to belt users—a fact to which our enormously increased sales testify. What is the significance of this CONTINUED SALES INCREASE—50% over last year? Simply that Goodyear Belting more than fulfills the claims made for it by the Goodyear people—who know what a belt should do, and make a belt to do it.

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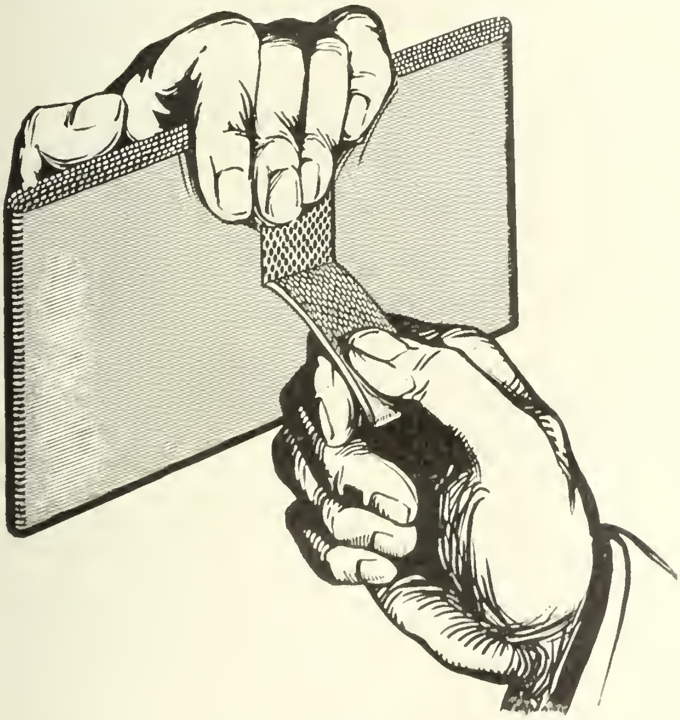

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Make a cut in the top layer—and then try to pull it apart. You will get a faint idea of its strength.

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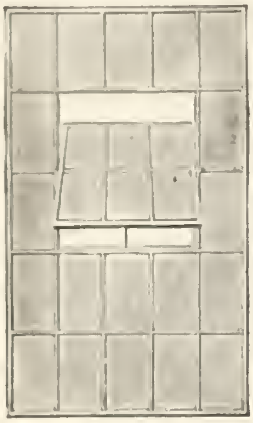

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Herringbone Lath, Best by Test

[illegible]ing of a stunt for [illegible] mortar

Examine the Herringbone ribs. They are the joists that stiffen the Herringbone Fabric. They turn excess plaster back on the Trowel. They prevent the clinch from dropping off. They save cost in plastering.

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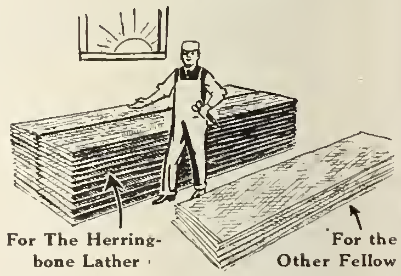
The longitudinal ribs act as furring ribs. The transverse strands are NOT against the backing. The lath is fully enveloped in mortar. Furring strips are not essential. Furring strips cost nine cents per square yard.

A DAY'S SUPPLY



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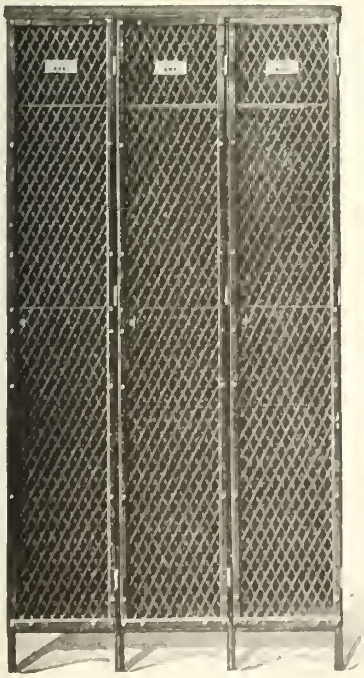

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ESTABLISHED 1886

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The Architecturally Uufit

THE elimination of the unfit from the profession of architecture is the end of a proposal which the Council of the Society of Architects is taking active steps to carry into effect. In a communication to the press the secretary of the above body points out that many persons present themselves as candidates for the membership examinations of architectural societies, but a considerable number of those who are relegated do not proceed further because these examinations are voluntary, and do not confer any statutory qualification to practise architecture, which is at present an open profession and therefore overrun with half-trained or entirely untrained men who assume the title and responsibilities of architects without proper training, and in some cases without any architectural qualifications, gaining their experience at the expense of their employers and the public.

It is felt by the Council of the Society that something should be done to place these voluntary examinations on such a basis as to provide some safeguard in the interests of the public and of the architectural profession. The system of education proposed is very similar to that of the Ateliers of the Ecole des Beaux Arts in Paris. It is intended to institute a method of examination which will eliminate from among the candidates "those who do not show any real aptitude for the profession and whose energies would be more profitably occupied in some other calling." Active steps are being taken to carry this proposal into effect and a strong and influential committee has been appointed to confer with educationalists and others on the subject. This committee has already outlined a scheme of operation and there is every evidence of its practicability.

If this proposal is meeting with such strong support in Great Britain, surely it is worthy of some consideration in a country like Canada! In a great country like ours, whose constructional development will occupy the attention of the civilized world for perhaps centuries to come, the elimination of the unfit from the professions of architecture and engineering is a subject of paramount importance. There should be no encouragement of the idea of "taking up" architecture. In the first place a man should be ardently attracted to the profession and in the second he should show marked aptitude. Canada has too many examples of architects who would be better employed, if not in some other capacity, at least in some less responsible position under qualified men who, in time, might impart some knowledge of the broad principles of design and construction.

The architects whose designs show poor conception and lack of knowledge will pass away, but unfortunately their traces may not be lost sight of, and in many cases the structures that they have planned will remain as an eyesore to those of another day and generation.

Monolithic Construction

IN these days when various systems of reinforced concrete based upon the assembly of members moulded in advance are being suggested, it is desirable that engineers and architects should bear clearly in mind the advantages inseparably connected with monolithic construction, says Ferro-Concrete (London).

One of the most remarkable qualities of ferro-concrete and reinforced concrete structures as customarily designed is the solidarity of the various elements of which they are composed. Every structure of the kind if executed with care by an experienced contractor is equivalent to a single block of concrete, reinforced by steel in all parts subject to tension, and the reinforcing bars may be regarded as continuous if properly disposed and anchored at their ends in the concrete. Thus the structure is capable of acting as a monolith of elastic stone, being in fact far stronger than would be a block of natural rock with the requisite interior spaces cut out and the exterior carved to the desired form.

No one can calculate precisely the effect of the solidarity of the parts in a ferro-concrete monolithic structure, but we know that it is very important. Every time exterior forces act upon one part of the structure, all the other parts lend their aid in withstanding the stresses developed, the extent of the co-operation so furnished depending upon the distance of the parts from the point of application of the forces. The continuity of which the effect can be approximately determined by theory, is in reality but a small fraction of that due to the monolithic nature of the construction.

Tests conducted by the Commission du Ciment Armé have furnished some interesting data relative to this subject, and further valuable records have been obtained in America by tests on several reinforced concrete buildings; one of ten storeys in Chicago, one of eight storeys in Brooklyn, and one of four storeys at Minneapolis.

The latter tests consisted in the determination of the deformations exhibited at certain points of the construction and of the corresponding tensile strains under the effect of loading distributed over isolated spans or upon series of continuous spans.

By laying bare the reinforcement at selected points and perforating the concrete, the deformations were measured with precision. On comparing the strains observed with those computed by theoretical formulae it was found that the former were considerably less than the latter, or in other words the actual factors of safety were greatly in excess of those upon which the calculations were based.

Similar differences are noticed in connection with almost every test of Hennebique structures. In some cases loads have been applied which, according to formulae, such as those of the R.I.B.A. Committee, ought to have been more than sufficient to cause the failure of beams which exhibited no signs of distress under the loading, and in other cases the infinitesimal deflections recorded have demonstrated the existence of unexpectedly large factors of safety.

Such differences result in great measure from the monolithic character of the work, an effect which is rightly excluded from calculations, but which it would be wrong to eliminate by departing from monolithic methods of construction. In this connection it may be mentioned that the adoption of expansion joints, and the destruction of continuity in beams and slabs by forming joints over the supports, are always inadvisable in ferro-concrete work, which differs in important respects from ordinary masonry and plain concrete construction, and therefore demands different treatment.

Responsibility for Contracting Delays

It seldom happens that important works are completed within the time originally stipulated in the contracts for their construction. The reasons for this are that the rate at which the work will proceed is affected by the contractor's credit and available cash, by the relative cost of work done in a leisurely way as compared with that done on overtime and in a rush, by the outlay required for tools and plant, by the probability, or otherwise, of getting extensions of time, and also by the attitude of the engineer towards the contractor and the work.

Contractors' Records

Contractors almost invariably keep a record of possible grounds for demanding extensions of time. Where the outlook seems favorable for an extension of time the contractor is, as a matter of expediency, more apt than not to slow-down the work and run the risk of paying a small penalty rather than rush it to completion if doing so would involve additional outlays for plant, equipment or for higher wages or overtime. There is usually enough of the gambling instinct in the contractor to impel him to this course, trusting to diplomacy and skillful argument to get him out of the difficulty with a net gain rather than a loss in the final settlement.

Inefficiency also is a common cause of delays, and is frequently chargeable both to the contractor and the engineer. Ignorance or inexperience, the employment of unskilled labor, insufficient plant, carelessness on the part of the engineer in giving wrong lines or grades, and dilatoriness in the placing of orders for materials are among the chief causes of delay chargeable to inefficiency.

Earthquakes and disastrous floods that destroy or make necessary a reconstruction of part or all of the work, financial crises, extensive strikes, panics, wars and that class of catastrophies generally called "acts of God," illustrate most of the causes of delay that lie beyond the control of the contractor.

Between delays of expediency and delays from uncontrollable causes the line is not always sharply drawn. Just how inclement or rainy weather must be to entitle the contractor to claim an extra time allowance will depend not only on how much rain fell, or on how many rainy days there were, or to how low a point the temperature dropped, but on whether these unfavorable conditions were unusual for that season of the year, or were of unusually protracted duration, or occurred at times when they had a disastrous effect on the rate of progress. The contractor's neglect to take advantage of good weather in prosecuting the work becomes of great importance in considering this question. Contractors are also apt to include as causes of delays beyond their control the failure of common carriers, manufacturers and supply agents to deliver the required materials.

Delays due to inefficiency are far more common than those of expediency, yet it is not always easy to differentiate between the two in specific cases, as inefficiency sometimes results from measures dictated by expediency.

Relationship of the Engineer

The relation of the engineer to the work depends to a large extent upon the wording of the contract, and he should be careful fully to understand his powers and the extent of his authority thereunder in order not to find, too late, that he has unwittingly, by usurping the contractor's rights, thereby relieved him of his proper responsibilities. The principal powers with which the engineer is clothed are those conferred by the contract. He has but few rights in dictating to the contractor how he shall conduct his work, how many men he shall employ, the order in which he shall carry out his work, or the nature of the plant he shall install, unless it can be clearly shown that the work cannot be properly completed on time with the organization already in existence.

Outside of passing upon the quantity and quality of the work done, the engineer is required to keep track, understandingly, of the rate at which it is being prosecuted, as bearing on the possibility of its final completion by a given date. This is a duty too often entirely neglected by engineers, sometimes from lack of knowledge of how to proceed, but still more often, it is to be regretted, from lack of interest, or from laziness or carelessness. Progress diagrams, to be posted daily, weekly or monthly, showing the dates of beginning and the time required for completing (as nearly as can be foretold) each part of the work, with a curve or line joining the two from O at one corner to 100 per cent. at the one opposite, and a time scale along the bottom, can be made to show graphically the work previously accomplished and the amount yet to be done. Plotting the force accounts on the same diagram will establish the relation between progress and the labor employed. A sufficient number of such diagrams, wisely chosen, will enable the engineer to keep informed as to which parts are falling behind and whether or not they require special attention. Such a system is also of value to the contractor, particularly on works of moderate size. It can be made to indicate to him the relative efficiency of the different foremen and superintendents, and thus form the basis for readjustments looking towards greater general efficiency.

The engineer should also keep a continuous photographic record of the work, during construction, and a daily record of all weather conditions, including rainfall, approximate velocities and directions of the wind, minimum, maximum and midday temperatures when pertinent; the conditions of roads, notes of shortages of supplies, force accounts distributed to their proper items, notes of all oral orders given to the contractor, and his compliance therewith, or otherwise; in fact, as complete a diary relating to the work as circumstances will permit.

As a rule contractors pay but slight attention to the orders of the engineer relating to rates of progress, considering him, often with justification, as incompetent to criticize from lack of knowledge of the conditions or lack of experience as a contractor. Fortified, however, with complete data regarding the progress of the work, and working under a contract containing a binding time-limit clause carrying a per diem forfeiture large enough to be a decided burden to the contractor should he be called on to submit to it, the engineer is in a very strong position.

It is seldom, however, good policy for the engineer to take possession of the work, under the over-time clause, particularly where it is far advanced and where a moderate delay would not in reality inflict a measureable damage. This is an expedient which should be used only as a last resort and in case of great need, and even then only with the guidance of legal advice.

Most contracts incorporate a time-limit clause, but when extra work or other conditions plainly entitle the contractor to an extension of time, failure to recite in the contract how or by whom this extension is to be allowed relieves the contractor of the penalty. This point, frequently overlooked in drawing up contracts, like other details of the relations of engineer and contractor, deserves attention.—Engineering Record.

It is estimated that 25 per cent. of the industrial accidents are due to insufficient illumination. This is particularly true where workmen pass from daylight to places lighted artificially. The artificial light may be sufficient for those accustomed to it, but the eye does not respond immediately to the change in light when passing from a very bright illumination to a place lighted at low intensity. It is therefore important that lamps be placed along walkways and thoroughfares rather than distributed uniformly over the whole floor.

The Cement Products Exhibition Company announces that space will be set aside at the Chicago Show for the exhibition of interesting articles made of concrete. Everybody is invited to offer for display, free of cost, any interesting thing of concrete which he has made or can secure for exhibition purposes. To each such object the management of the show will attach cards, giving information as to the maker and so on. The exhibition is attracting universal attention and promises to be the greatest ever held.

The Architect and the Builder

An interesting discussion of the relations of the architect to the builder and of the builder to the architect is contained in the last Monthly Letter issued by Secretary William H. Sayward, of the Master Builders' Association of the city of Boston. We present the following extracts:

"The question of the relation of architect to builder and of builder to architect is one of perennial interest, and from a business point of view alone every practitioner in either department should feel the liveliest concern in the existence of the best possible conditions in these relations in order that the owner, whom architect and builder conjoin to serve, shall receive that to which he is entitled, and those who thus unite to serve the owner shall receive that which they are entitled to receive from the owner and from each other.

"It is of primary importance to accept as an indisputable fact that building cannot be treated as part profession and part trade or business. Building is a process which from start to finish demands the service of trained men assuming different fields of responsibility but operating together to produce wished-for results. There is no point in the process where the effect of the designer and planner may be said to end and that of some other operator to begin. The initial study, even before it materializes in the first sketches upon paper, presupposes the carrying out of the idea into actual form. Building begins with the conception in the mind of the designer, and every subsequent movement toward the end in view, whether it be of draughting-pencil, or mechanic tool, or direction and control, is not only tributary to that end, but an inseparable part of the process.

"It is, of course, natural and to large extent imperative that responsibility for various parts of the process of building be divided; that he who conceives the design, prepares the necessary description of proposed structures, makes the drawings illustrating how the materials are to be put together, and has supervision of the work, should be distinct from the operator who has direct responsibility for the actual practical combining of mechanical forces, human labor and inert materials to produce the desired end. It usually would be advisable, under conditions of contracting for execution of work at a fixed sum, to do otherwise than divide the process of building as above indicated, but out of this separation has arisen a sense of sentiment that there is an opposition of interests between architect and contractor.

"It is true that in carrying on building work under the conditions described it has constantly been insisted that the architect may also assume the function of a judge, and act as an unprejudiced referee upon disputed points; but, as a matter of fact, this purpose, however sincere, defeats itself, for under such a rule the architect is called upon for a service which only a superman could fully render. The differences which arrive at the stage of dispute are almost invariably based upon interpretations of the instruments which the architect himself is responsible for, and, as in the practice of law a judge is not considered acceptable in a case where he is personally interested or to which he is intimately related, so in disputes arising out of building work it is equally inappropriate that the architect be placed in the position of absolute arbiter on all points arising in the carrying out of work based upon his own design. But the practice has been in vogue for many a year, and out of it has grown this wholly undesirable and in most cases unjustifiable feeling that the architect in his decisions leans perceptibly in favor of the employer, that is, the owner. Specific cases where the contrary attitude is positively in evidence are not frequent enough to be held as seriously modifying the general condition, and in any event it is very plain that the circumstances impose a service of extreme difficulty upon the person who already has a responsibility much greater than the usual fees compensate him for assuming.

"There can be no question that some improvement can be made which will relieve the architect of this extremely difficult atmosphere."

A Prophet with Honor

IT would appear from the following editorial abstract from the London Advertiser that either there is a commendable disposition on the part of the daily press to give more open recognition to engineering skill or that Mr. Willis Chipman has not been assigned a place in the preponderating ranks of the "prophets without honor:—"

The Board of Works has taken a businesslike step in engaging Mr Willis Chipman to check the plans for the proposed storm-water sewers.

Mr Chipman is the engineer who planned the hygienic sewerage system installed fifteen or sixteen years ago, during the mayoralty of Colonel J. W. Little. His work was well done. There would be no problem to-day if the city had taken his advice by making provision for carrying off storm water by independent sewers. Now there is a costly arrears to be made up, with much hardship in the meantime to innumerable householders.

Mr. Chipman is an expert of the highest rank, and as the designer of the present sewerage system in London, he understands local conditions, and will feel a personal responsibility. It is better to pay well for the best advice in an undertaking which runs into hundreds of thousands of dollars.

Stresses in Railroad Track

STRESSES in railroad track are prominent among the unknown factors in engineering regarding which there is need for experimental investigation and the collection of data based on service observations, says the Engineering Record. Emphasis has again been laid on this point in the report of the Interstate Commerce Commission on the derailment of the Twentieth Century Limited on March 31, 1912. The finding is that the derailment was due to spreading of the track, probably because of the inability of the outer rail of the curve, in its shimmed position, resulting from winter conditions, to withstand the thrust of the locomotive running at high speed. The track seems to have been in good condition fulfilling the requirements of the best practice, though the unusually severe winter had necessitated extensive application of the customary measures for maintaining surface at such times. Here is where the argument is raised, in that the line of demarcation between safe and unsafe practice in track construction has not been determined. It is not known what margin of strength is present in track above the immediate demand of the load. Though it is extremely desirable to have this information, there are many difficulties to be met in obtaining it, due to the large number of variables involved. Type of construction, drainage, season and similar factors are involved in the track itself, while speed, condition of equipment, curvature and surface are among the variables affecting the application of the load. But some very good progress has already been made toward definite information. The American Railway Engineering Association is giving attention to the subject, and has made preliminary studies leading toward more accurate knowledge of track strength and stresses. Among these might be mentioned those of last year on roadbed pressures, the tests of spike pulling values and the impact measurements on bridges. The investigations of the Pennsylvania Railroad on the proper depth of ballast, reported to the Association in 1911, also throw much light on the distribution of loads on ties and roadbed. The Canadian Society of Civil Engineers, recognizing the probably existence due to increased loads of stresses not satisfactorily distributed by the old, short ties, has advocated a longer tie. These are indications that an effort is being made to obtain practical data bearing on track. If research is further encouraged, a much more definite basis of design than the present should be obtained, though it may not be practicable to bring it to the exactness of the data underlying the design of steel bridges.

Tests of Building Materials

The United States Bureau of Standards is doing important work at Washington in testing structural materials and has recently installed two pressure machines, one of 200,000 tons and the other of 2,000,000 tons capacity. These machines are capable of most delicate adjustment, registering automatically the exact pressure applied. Steel bridge beams, steel rails, stone and concrete pillars, may all be tested on these machines to determine exactly the load they will bear up to the breaking point. A broken rail or a broken beam after being tested is carefully examined with the miscroscope to discover the flaw in its construction on which it broke. The cause of that flaw, whether in the original material or in the process of manufacture or cooling, is determined and the information is made public.

Important as this information is it is representative instead of specific. It can be applied only to a sample rail or beam or pillar. The International Association for Testing Materials has been working on different lines for the discovery of some satisfactory tests that can be applied to the actual material of which a bridge or building or railroad track is being constructed—indestructive tests. Some of these tests are easy to apply. The presence of cavities may be tested through the density; that of plastic deformation through the 'potential'; microscopic and magnetic testing are already well advanced. Transparent materials may be tested by the behavior of polarized light passing through them. Sound, electricity and other radiations may be used for testing. The pitch or volume or timbre of sound emitted by a rail may disclose much of its internal construction. But all these tests are still to be reduced to a system. Their natural service will be to supplement the destructive tests of sample rails and beams. Thus the tester of the future may prove his material by the vicarious destructive tests of coupons, and prove his structures themselves by these indestructive tests.

The Toronto Railway Company, which has the exclusive franchise for operating a street railway system within the city limits, has 107.24 miles of track on the streets and 7.42 miles in the sheds.

Lewis Building Company's Ten-Storey Structure at Montreal

WORK has just been commenced on a ten-storey office building on St. John and Hospital streets, Montreal, for the Lewis Building Company. The architect is Mr. Kenneth G. Rea, A.R.I.B.A., and the contractor Mr. E. G. M. Cape. The site covers an area of 10,700 feet, and the building will be situated in the commercial district, having entrances on both streets. The exterior up to the first moulded course will be of grey Stanstead granite, and the remainder will consist of Ohio sandstone, the frame being of steel. The steps to each of the entrances will also be of Stanstead granite. The inner 4 inches of all walls will be of hollow terra cotta blocks.

The floors are to be of reinforced concrete, while the roof will be of the same material. The interior partitions will be built of gypsum or terra cotta blocks 4 in. thick. Walls, ceilings, and partitions will be plastered with three coats, two with Rocalite and the other with fibred material.

All doors are to be of drawn steel, the upper panels being fitted with rolled plate wired glass, and all borrowed lights are to have metal frames and wired glass. The two main vestibules will have Dominion marble dados and the main hall will also have a dado of the same marble. The main stair to the first landing is to be of marble, Missisquoi vertigris marble being used on the other floors. All terrazo floors will have borders of marble. Three electric elevators will be installed. The heating will be by means of a low gravity pressure system, all the radiators to be supplied by Steel and Radiation, Limited. The coal trolley will be installed by the Canadian Fairbanks Morse Company, and the same company will furnish other trolleys and an overhead track in connection with the heating appliances. Two five horse power motors will run several vacuum cleaning machines.

Proposed Lewis Building, Montreal

Sand-Lime Brick Manufacturers' Convention at Toronto

THE 9th annual convention of the American Association of Manufacturers of Sand-Lime Products was held at the King Edward Hotel, Toronto, Dec. 3-4. This was the first time that the convention had been held in Canada and the meetings were attended by many of the leading manufacturers on the continent.

The sessions were presided over by Mr. S. O. Goho, of Harrisburg. The convention was called to order at 10 a.m. on the morning of Dec. 3 by President Goho. This session was devoted to the registration of members, the presentation of reports and the appointment of special committees. The business session was continued in the afternoon. The papers presented on the first day were as follows: "Some Thoughts on the Development of the Sand-Lime Industry," by Mr. P. L. Simpson, Chicago, Ill. "The Present Condition of the Sand-Lime Brick Industry," by Mr. W. H. Crume, of Dayton, O., and "Results of Testing Sand-Lime Brick," by Mr. Warren E. Emley, of the U. S. Bureau of Standards, Pittsburgh, Pa.

In the evening the members of the Association were entertained at a banquet by the city of Toronto and the Harbor Brick Company, after which a general business discussion took place.

On the second morning the delegates were the guests of the Toronto Sand-lime Brick Company and the Toronto and Harbor Brick Company, and visited both plants. The afternoon was devoted to a business session.

The following officers were elected for the ensuing year: President, S. O. Goho, Harrisburg, Pa.; Vice-president, F. B. Allan, Toronto; Secretary, W. G. Plummer, Jr., Buffalo; Treasurer, John L. Jackson, Saginaw, Mich., and an executive of five officers representing the various divisions of the association, as follows:—Canadian, G. Sylvester, Calgary; Western, E. G. Chapman, Minneapolis; Eastern, W. M. Birchfield, Rochester; Central, L. W. Penfield, Willoughby, Ohio; and Southern, H. H. Tift, Tifton, Ga.

A change has been made in the name of the Association. It is now known as The Sand-Lime Brick Association. The next meeting will be held on December 9th and 10th, 1913, at Harrisburg, Pa.

A supplementary report of this convention will be published in a later issue of this journal.

Montreal building permits for the current year to the end of November totalled in value $18,957,280, an advance of $5,000,000 over the corresponding period of last year. The November permits represent an expenditure of $2,983,986, compared with $878,045 for November, 1911.

Toronto's building permits last month totalled $1,651,073 This is considerably less than the figures of 1911, which were $2,276,810. For the eleven months' period from January 1 to November 30, however, 1912 is easily ahead of 1911, the figures being $25,465,076, and $22,583,507 respectively. The number of buildings erected this year is 9,763, as compared with 9,364.

Brick Veneer Hollow Tile Construction

Its Advantages in House Building—The Practical Side of the Question—Satisfactory Procedure in the Actual Work*

WHEREVER you go you will find plaster houses, meaning houses with plastered exteriors popularly known as "stucco houses" (an erroneous appellation, like many others originating in the popular mind).

Many architects, however, prefer brick. Not that they disbelieve in plaster (a material which after many years of use has won for itself a place as one of the best building materials), but because they have a natural liking for brick houses. Go where you will, brick of the right color has a decorative effect superior to any other material. Unless it be the new texture tile there is no other substance so warm in color as red or brown brick or any of those beautiful shades between—in which reds, browns, and yellows mixed together produce a wall with all the variegated shades and interesting texture of an Oriental rug.

Brick houses of to-day hark back to the brick houses of yesterday. Take a trip through most any of the new suburbs of New York and Boston, as I did recently, and you will be impressed with the fact that the tendency in brick house design is toward the old types of New England, New York State, Pennsylvania, and the South; in plan, the same simple parallelogram—in composition, one window over another with a cornice composed of the least possible number of plain moldings. In fact, a result very much along the lines of what we are pleased to call (most of us) "Colonial."

If there hasn't been much change in brick house design since olden times when men walked to church in knee-breeches with silver buckles on their toes, there is, however, a decided difference in brick house construction. Here is where we shine to-day over builders of yesterday. House construction has been developed to a point so far beyond that of twenty-five years ago there is scarcely any comparison.

In the first place, old-time brick houses were usually built with solid brick walls from basement to attic. First-class brick they were composed of, too, but like any other solid wall even when a good grade of hard-burned brick is used dampness permeates the wall, communicating with the air inside, producing a damp house. Many old brick houses in Salem (Massachusetts) and again in Marblehead, are lined deep with mold behind the plastering. Upon entering from the fresh air outside you are immediately impressed with the peculiar musty smell of the rooms—a quaint, artistic odor one must confess but one that the family physician tells us indicates a condition not conducive to good health.

After solid walls had been used for many years some bright chap thought up the hollow wall, and for many years the hollow brick wall was supposed to be the ideal construction.

In building hollow walls of brick the most practical seems to be a 12-inch wall, consisting of an outer wall of face brick 4 inches thick followed by an air space 4 inches deep, lined by another 4-inch thickness of brick. Thus, the amount of brickwork is really 8 inches, there being an air space of 4 inches between exterior and interior walls. This was for many years considered a practical form of construction and houses built by this method proved considerably dryer than buildings with solid walls. Indeed, some builders have been courageous enough to plaster directly upon the inside of such a wall (without using furring and lathing), believing the air space sufficient insulation to prevent dampness from penetrating the inner wall.

After a short time, however, it was discovered that moisture was apt to enter a building at the side of the window frames where (in order to strengthen the walls) it was necessary to tie the front wall to the back wall with brick headers. These brick ties connecting the two walls proved to be bridges which carried moisture from front to back, where dampness was apt to penetrate to the rooms.

The next step forward in brick house construction was the elimination of as many of these brick ties as possible by using metal wall ties, and this form of construction has proved quite satisfactory in many houses where care is used to employ only ties of round wire and apply them carefully so that daubs of mortar will not cling to them (bridging across the air space and conducting moisture in that way). One

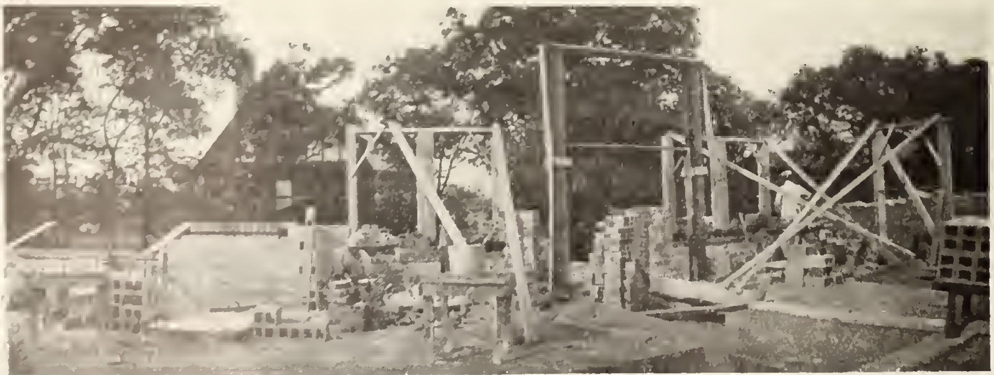

Fig. 1—Brick veneer job showing the best form of brick veneer wall construction

great objection to metal wall ties is, of course, possibility of their rusting away at some future time, in which case the outer wall might naturally drop away from the inner wall causing a building to collapse.

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*By Charles E. White, Jr., in Building Progress.

Architects and builders skilled in brick house construction have always been in favor of the hollow brick wall construction. They have been quick to understand its advantages. Indeed, most architects and builders have had some experience with one kind or another of hollow wall construction. It must be confessed, however, that the hollow brick wall has many disadvantages. Cost of the hollow wall is considerably in excess of cost of a solid wall, because it takes so much more time to lay brick that way. Whether inner and outer wall are tied with brick or with metal ties considerable time is spent by masons plumbing and levelling two walls instead of the one wall in a solid wall. Then, there is time consumed preventing mortar from stopping the air space. In addition to these disadvantages architects understand that a hollow brick wall, no matter how well built, is less strong than a solid wall. If joists bear on but one wall (the inner), the support provided is not sufficient. On the other hand, when joists extend so as to get a bearing on the outer wall it is necessary to chip the face brick where they pass the end of each joist, in order to cover them properly at this point.

Hollow tile construction seems to solve the problem for brick houses better than any other method. This form as most often employed consists of an exterior facing of outside brick (which is really a veneer) backed up with hollow tile (Fig. 1). Here we have the principle of the solid wall (practically, so far as strength is concerned) combined with the advantages of a hollow wall (so far as insulation goes). It has been found in many buildings that in localities not too far from the source of supply the cost of brick backed with hollow tile is slightly less than the cost of a solid brick wall. Brick veneer on hollow tile in most instances has been found less costly than hollow walls of brick. Really, there is no comparison between the permanency of the former as compared with the latter.

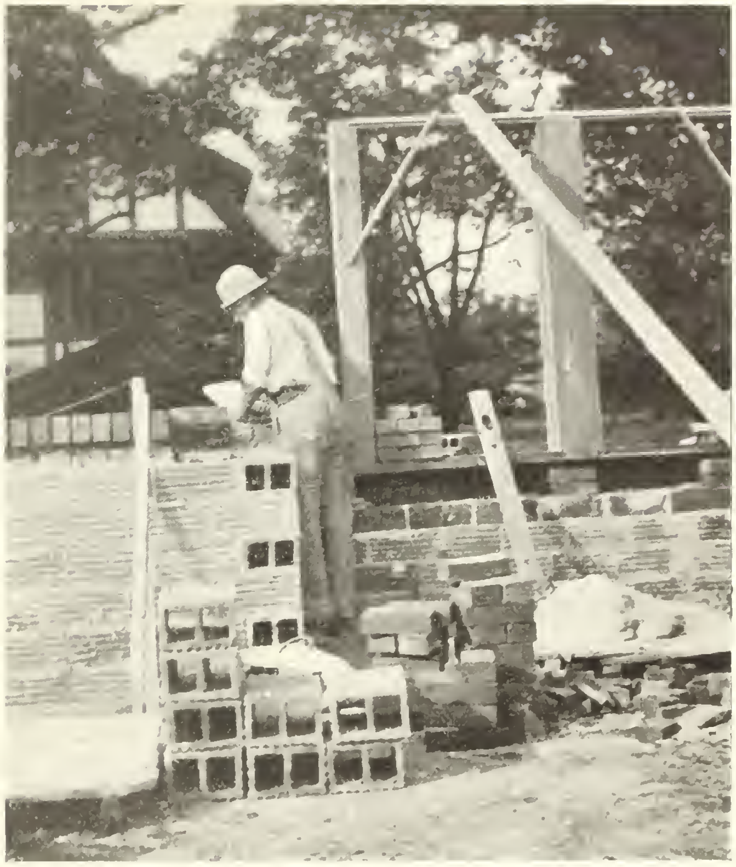


Fig. 2 Detail showing brick veneer backed with 8-inch hollow tile blocks, producing a moisture-proof wall 13 inches thick at the cost of an ordianary brick wall

There are many methods of building brick veneer with hollow tile. Almost any kind of tile can be used, set on edge or flat-wise. The method which might be called best (as it is the culmination of many years of experimental brick veneer building) is the use of what are known as "bakup" blocks, laid flatwise (Fig. 2). These blocks are of the right size to course naturally with standard brick, being 5 in. x 4 in. x 12 in. and 5 in. x 8 in. x 12 in. Exterior brick veneer is usually attached to the tile backing by means of metal wall ties applied every sixth course of brick. These, laid in the joints and entirely cov-

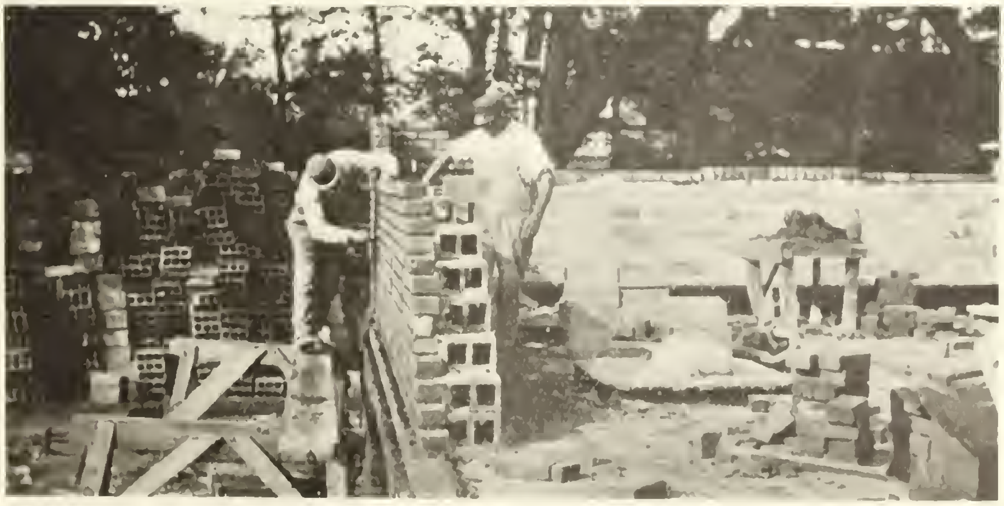


Fig. 3 Brick veneer laid from outside: one man lays lays face brick while another backs up with tile. This is a good method for large houses

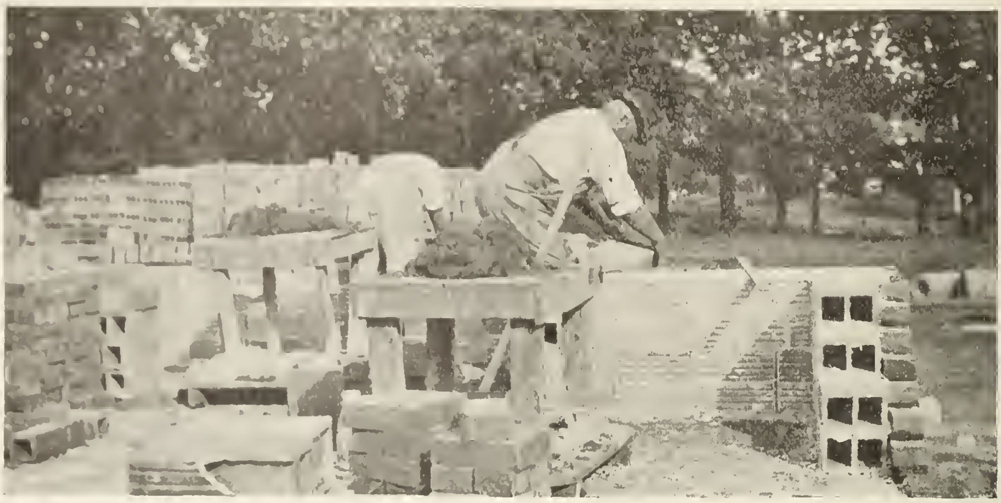


Fig. 4—Most economical method for ordinary jobs, brick veneer and tile backing laid "overhand" from inside. No scaffolding is required

ered with mortar are not subject to rust like metal ties used in hollow brick walls, where metal extending through the air space cannot be entirely coated with mortar.

Face brick in hollow tile wall construction can be laid either "overhand," or from the front. One of the best methods is to put one mason on an outside scaffold to lay up his brick a course or two ahead of another mason who backs up with "bakup" blocks from the inside (Fig. 3). Many jobs are put up "overhand," however, with both face-brick and tile backing laid from the floor, saving the cost of exterior scaffolding (Fig. 4).

No inside furring is required on a brick veneer wall lined with hollow tile, as the tile are scored to receive the plaster. Tile being so dense no moisture can penetrate the wall.

In a fireproof house when brick veneer on tile is used holes in the tile are left, for bonding the cross partitions of tile. At the angles, tile are laid alternating, and the holes left in every other course are afterward blocked by tucking in bats slushed with mortar (Fig. 5). Considering all things, brick-veneer-hollow-tile is a valuable acquisition to the family of building methods. It has already become "standard" in the offices of most architects and promises to increase the demand for brick houses, since it reverses the criticism of so many owners that "brick houses are damp."

The 1911 mileage statement of improved roadways in the city of Toronto is as follows: asphalt, 143.51; asphalt block, 5.98; cedar block, 10.41; brick, 27.55; macadam, 41.01; wood on concrete .64; stone and scoria block, 2.16; gravel, 21.56; concrete, 3.78; bitulithic, 31.98. Unimproved roadways, 129.80. Sidewalks: stone flag, 1.73; concrete, 501.93; brick, 3.66; wood, 54.16; sewers, 335.72; water mains, 433.84; gas mains, 456.00; street railway, single tracks, 107.10.

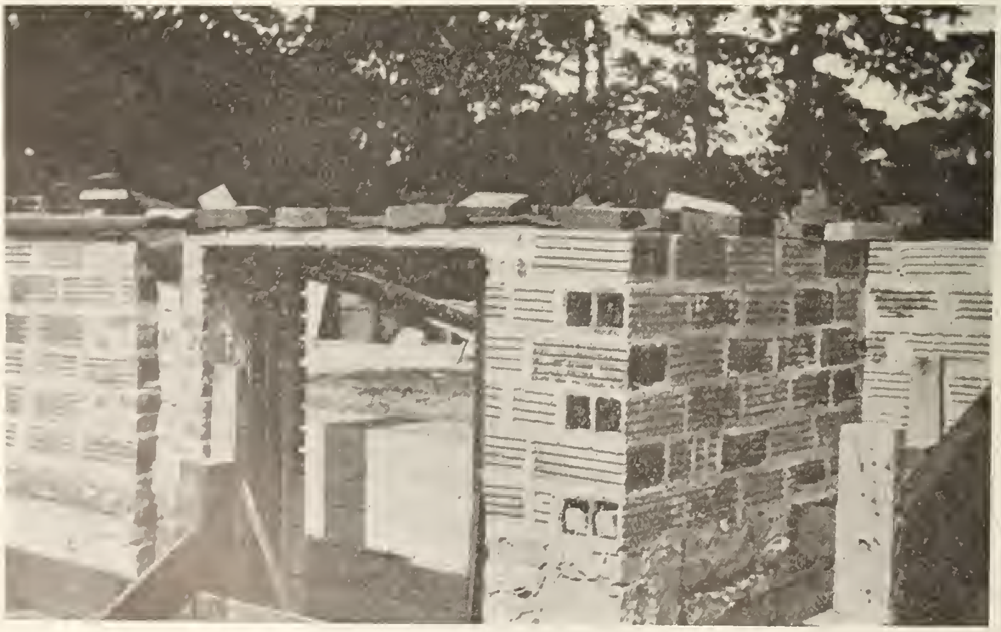
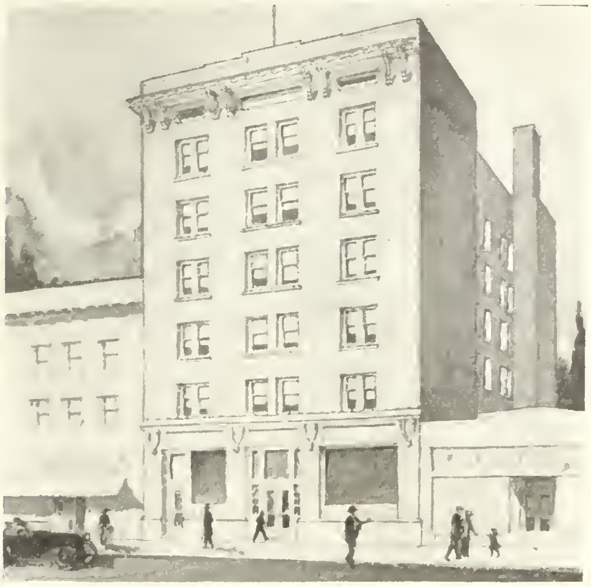


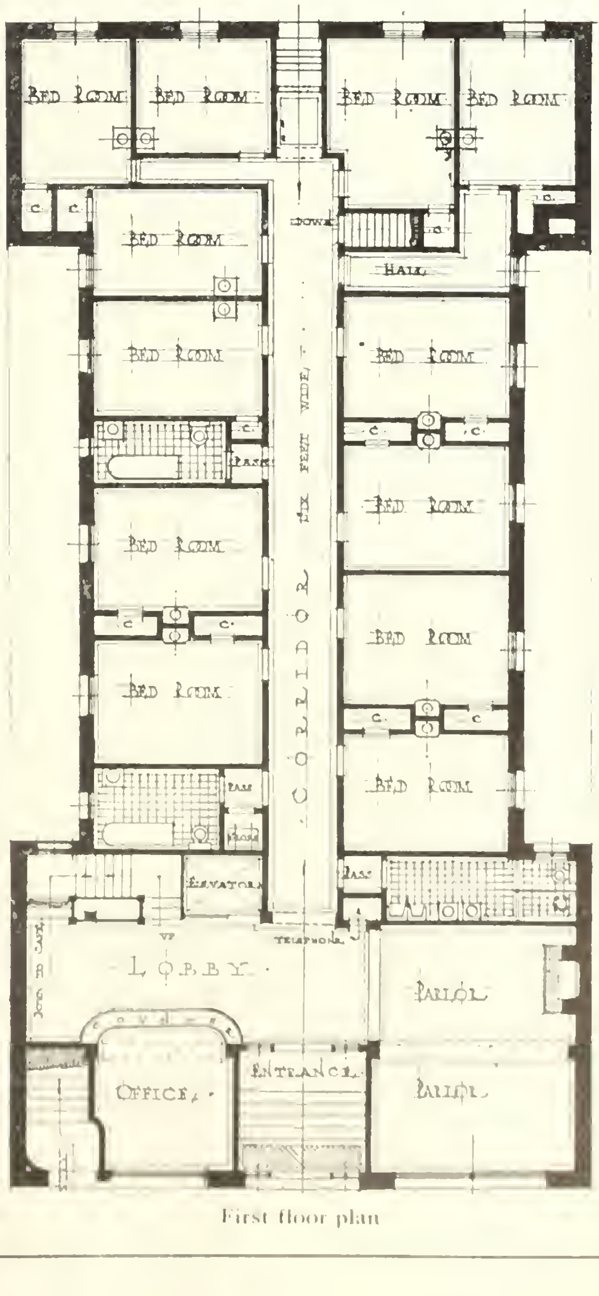
Fig. 5—Holes left for bonding inside across partitions

Proposed Hotel Building, Calgary

THE illustrations reproduced herewith are of a proposed hotel building which is to be erected on 18th avenue, Calgary, Alta., according to plans prepared by Messrs. Stanton & McKenzie, of that city. The building rests on concrete foundations and is constructed with solid brick exterior walls. The interior floors and partitions are of tile construction (long span) carried on a steel frame. The structure is to be fireproof throughout. The dimensions of the proposed structure are 97 by 50 feet. There will be six storeys and basement and the building will contain 100 bedrooms, in addition to a rotunda, etc., and cafe in the basement. Steam heating will be installed, natural gas being used as fuel.



Proposed hotel building, Calgary



First floor plan

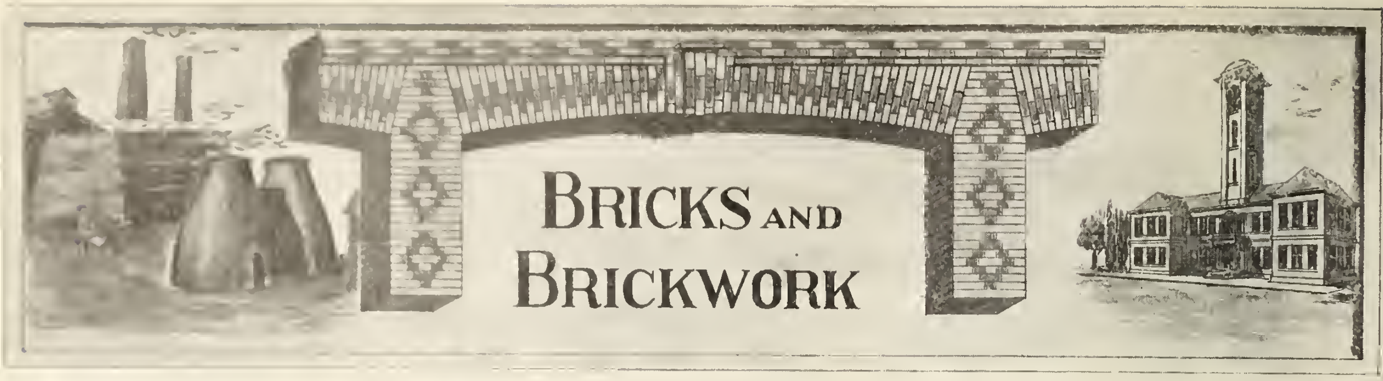
How to Patch a Concrete Floor

WHEN a cement floor surface begins to wear it is often desirable to patch it and the way in which this can be done to the best advantage is described in a recent paper prepared by President L. C. Wason, of the Aberthaw Construction Company, Boston, Mass. In this paper he gives the wrong way to do the work as well as the right way.

The Wrong Way.—Commonly a sand and cement mortar is made, some cutting is done and the mortar is put in and scrubbed with a steel trowel until smooth. It is then covered up for awhile. If the concrete under the patch is left dry it soaks up the water of the mortar. As a result, the mortar does not set. If the room is dry or hot the surface of the patch dries out and for the same reason it does not set. If the concrete under the patch is dusty the patch does not adhere to the concrete. If the materials in the mortar are not suitable, naturally the patch wears badly, particularly as it is obviously located at a point of severe wear.

The Right Way.—Cut down the worn place at least 1½ in. This cutting should be carried into the strong unbroken concrete and the edges should be cleanly undercut. The bottom of the cut should then be swept out, clean blown out with compressed air or a pair of bellows, if available, then thoroughly wet and scrubbed with a broom. In this way small loose particles of broken material which the chisel has driven into the surface are removed. A grout made of pure cement and water about the consistency of thin cream should be scrubbed into the pores with a broom or brush, both at the bottom and sides of the cut. Following this a stiffer grout, about the consistency of soft putty, should be thoroughly compressed and worked into the surface, which has already been spread with grout. Finally, before the grout is set, a mortar made of one part cement to one part crushed stone or gravel, consisting of graded sizes from ½ in. down to the smallest excluding dust, should be thoroughly mixed and put in place, then floated to a proper surface. Cover with wet bagging, wet sand, sawdust, or other available material. All trucking should be kept off and the surface kept thoroughly wet for at least one week or ten days.

If a particularly hard surface is required, 6-penny nails are sometimes mixed with the mortar and other nails stuck into the surface when the patch is finished. This will produce a surface which is extremely hard and durable.



Details of Modern Brick Design—2

Second and concluding article contributed by S. H. Penlington, A.R.I.B.A.

It will be noticed that the general idea of design which characterizes the accompanying sketches is the same as that which prevailed in the illustrations shown in the first part of this article published last week. Stated briefly it is an interesting arrangement of the brickwork, together with a color scheme obtained by the use of tapestry or other bricks. Attention is directed to the broken bond and the use where necessary, of wall ties or anchors. Generally the loads are comparatively light on these walls; in other cases the work is purely veneered, attached to a steel or concrete structure, where the use of artificial bond is a recognized part of the construction. Elaboration of brickwork occurs most frequently in the upper walls of small buildings in places such as gables and friezes where artificial bond is least likely to be required. In the main walls and piers where heavy loads are encountered artificial bond will probably be found necessary if the true bond of the brickwork is broken.

Wall treatments, gables, etc.—Walls are generally divided by pilasters or piers and the piers and panels may be emphasized architecturally. In Figs. 15 and 16 the piers receive the ornament leaving the panels between them to receive the windows or doors. Fig. 15 is a broad pier of tapestry brick in colors with wide mortar joints. The height is 5 storeys and the pier forms one side of a frame to a modern store front. The bricks shown in Fig. 16 are all of the same texture, depending entirely for their interest upon the arrangement of the work and the sunken panels. In Fig. 17 there is shown an inset circular corner. The arrangement of the brickwork here is a practical necessity as headers must be used. This corner might have been built square in the usual manner but it would have been very uninteresting by comparison.

The upper portion of a cottage wall is shown in sketch No. 18. The whole wall is divided into panels with half brick pilasters and strings, reminiscent of the Elizabethan timber houses. In Figs. 19 and 20 there are shown the lower portion of cottage walls above the plinth. This style is always interesting in cottages where one looks for some originality on the part of the owner.

Brick gables finished with stone copings are shown in Figs. 21 and 22. Here is one of the most conspic-

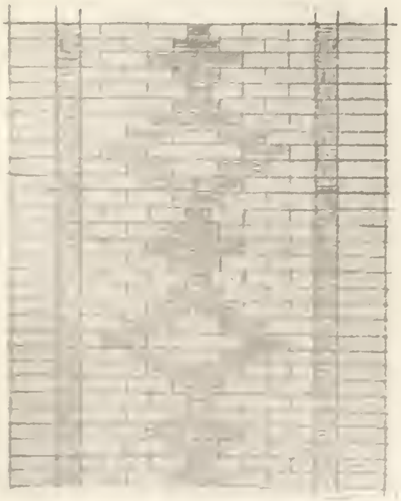


Fig. 15

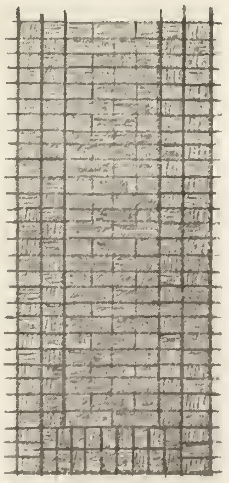


Fig. 16

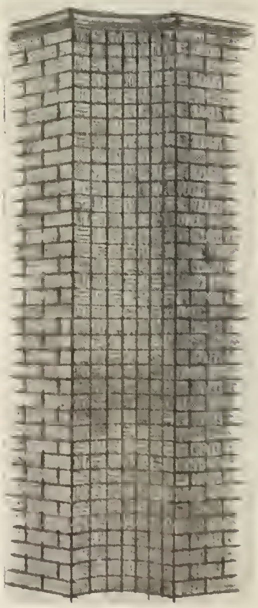


Fig. 17

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* For first part of this article see last issue.

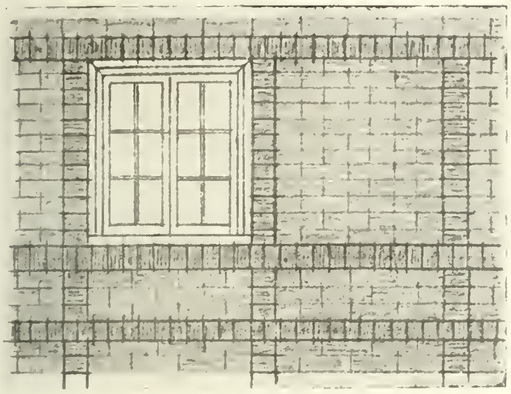


Fig. 18

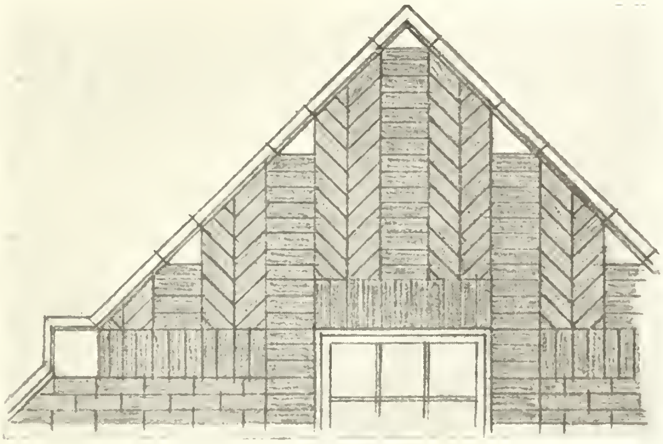


Fig. 22

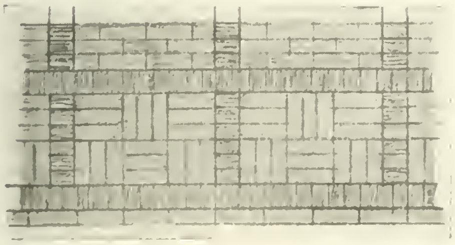


Fig. 19

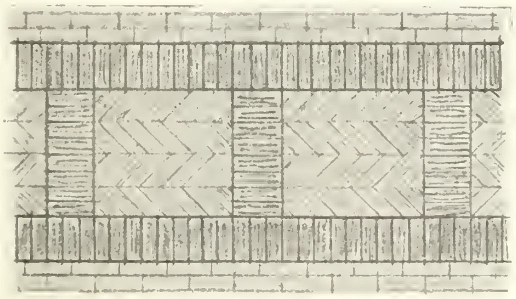


Fig. 20

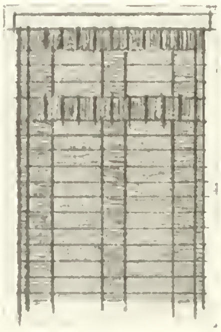


Fig. 23

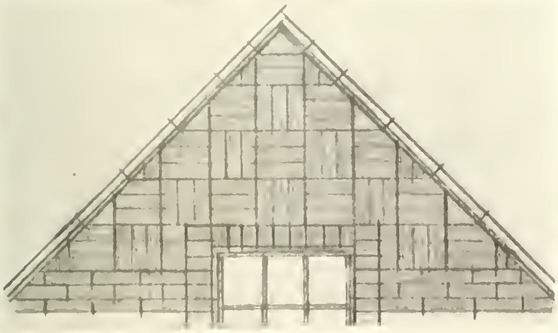


Fig. 21

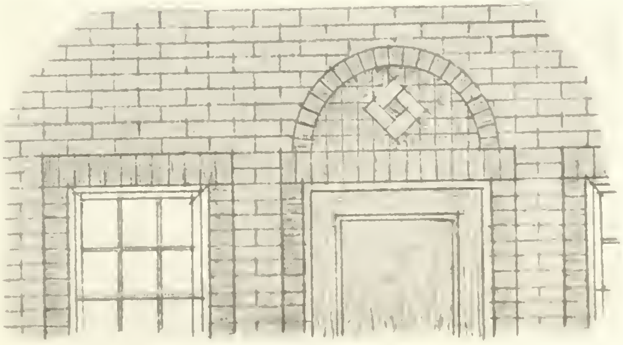


Fig. 24

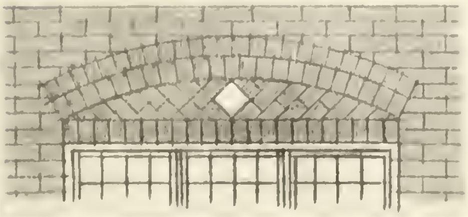


Fig. 25

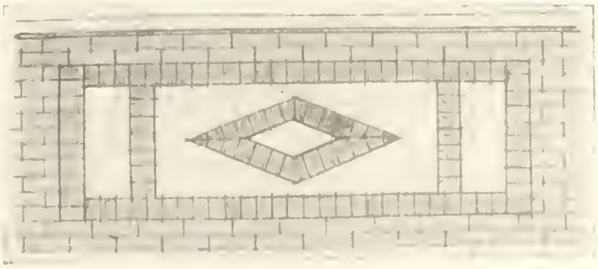


Fig. 26

uous features of a house and it generally receives a stone panel or some other ornament. In the work illustrated by the two sketches the light and shade obtained by the different manner in which the bricks are laid are productive of sufficient interest.

Fig. 23 illustrates a two-flue chimney stack with tapestry brick pilasters, necking course and cap, with stone coping—a very simple but imposing stack if given sufficient height and not stilted. The stack is suggestive of the fine open fire-place with warmth and comfort.

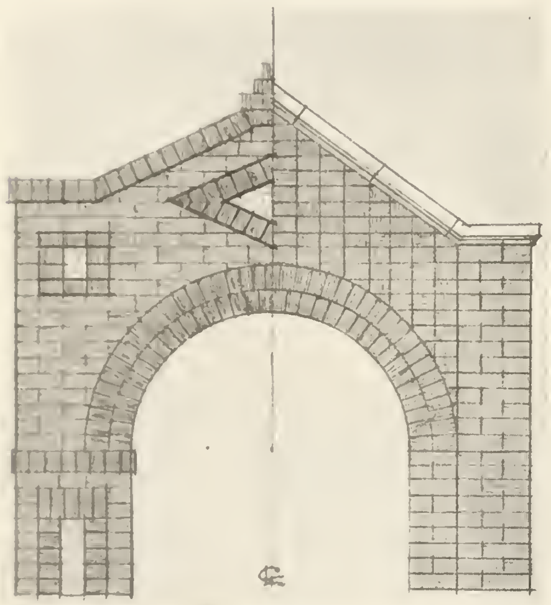


Fig. 27-8

The treatment of door and window heads is illustrated in Figs. 24 and 25. The door and windows together suggest a canopy, taking the general outline of the semi-arch and flat arches and leaving a sufficient field of brickwork above, so as not to crowd them. The result is very pleasing. Fig. 25 shows an arch, structurally correct, with a brick tympanum and stone panel to lend interest.

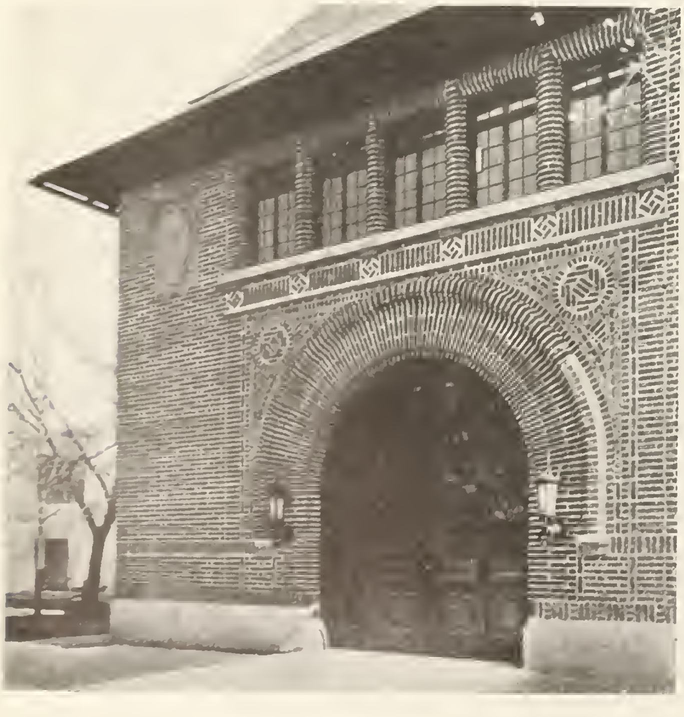


Fig. 29

The panel shown in Fig. 26 is in a parapet wall with tapestry borders, pilasters and centre piece filled in with stucco. Such a panel would make an interesting feature for the centre of a building.

Two designs for a porch or porte cochere are shown in Figs. 27 and 28. These illustrate the use of tapestry brick in the first place and ordinary facing brick in the other. Both are simple and yet possess sufficient ornament to make them interesting.

The front of a fire station at Garden City, L. I., designed by Messrs. Ford, Butler and Oliver, architects, is shown in Fig. 29. This illustration shows the possibilities of the material and is illuminating as to the results that can be obtained by the studied use of tapestry brick.

Summary.—It is generally admitted that brickwork is emerging from the obscurity that has enshrouded it in the past and that it is taking its place as second to none in the field of building materials. Almost every conceivable color and texture can be obtained in brick. All tastes and fancies may be gratified, while in working out schemes in brickwork there is the assurance that the colors are permanent and the life of the material endless. The freedom with which bricks may be used is shown in Fig. 29. One might almost say that the variety of design in this field is illimitable.

In general design broad flat surfaces, panels and flat bands with slight projections should be aimed at. Stone should be used sparingly. The greatest charm of the tapestry brick is its soft fabric-like texture—a quality which practically precludes all vulgar display on the part of "people of means."

In conclusion it might be ventured that the ease with which brick can be handled, its beauty, its durability and its economy establish its pre-eminence as a building material on this continent as it has done abroad.

Waterproofing Concrete Floors

CONCRETE floors should never be treated or dressed until they are thoroughly dry and well seasoned, and the dressing should be applied before they have been subjected to traffic or wear. In some instances it is necessary to use an acid wash or some other neutralizing medium before applying the dressing to concrete floors.

When the concrete is thoroughly dry and seasoned, two coats of concrete floor dressing should be applied. Making a cement mortar veneer of one-half inch thickness, and applying two coats liquid cement upon the surface, after the same is thoroughly dry, produces a sanitary and light radiating basement.

Concrete floors having exceedingly fine, close texture, floated to a dense surface, which carry at times a semi-gloss finish, should be treated as follows: The surface should be gone over lightly with a carborundum rubbing brick in order to establish a bonding surface that will enable the concrete floor dressing to knit close to the floor structure and practically become integral with it. This will prevent scalping and peeling of the floor dressing. The floors should, of course, be cleaned, thoroughly dry, and well seasoned before the first or priming coat of concrete floor dressing is applied. Transparent floor dressing of any color desired may be used. It should be applied by means of a suitable brush, preferably a flat 5 or 6-inch white bristle brush. The dressing should be worked well into the pores of the concrete, spreading it well over the floor surface to develop a thin film. The temperature conditions during the periods of application and drying should not be under 70 degrees Fahrenheit to insure the best results. The second coat should not be applied until the first or priming coat is thoroughly dried, which under proper temperature conditions requires from two to three days. The second coat should be brushed out evenly and uniformly over the surface in the same manner as one would apply a finishing coat of floor varnish, and it should be given from four to six days for thorough hardening. Two coats develop a very satisfactory result, though three coats should be used where floors are submitted to unusual wear, such as floors that are used as passages, aisles, and runways, over which heavy trucking is done.

Concrete floors of exceedingly coarse texture should be cleaned, thoroughly dry and well seasoned before the first or priming coat of floor dressing is applied. Either the transparent floor dressing or any color desired may be used, and should be applied by means of a suitable brush, such as is described for its use on concrete floors of fine texture. The dressing should be worked well into the pores of the concrete in order to bond and bind it thoroughly. The temperature conditions during periods of application and drying should not be under 70 degrees Fahrenheit to insure the best results. After the first coat is thoroughly dry all surface areas or spots which may show unusual absorption or penetration of floor dressing should be "touched up" or gone over with an additional coat of dressing, in order to prepare a uniform surface for the finish coat. After the first coat is thoroughly dry, the finishing coat should be applied, brushing same out evenly and uniformly over the surface, as described in the specification for concrete floors of fine texture. The finishing coat should be allowed to harden from four to six days.

Concrete floors of irregular texture—by which expression is meant those floors which are made up of extremely fine and extremely coarse texture, laid irregularly, which is sometimes due to carelessness, but often due to unforeseen conditions—should be given a joint application of the specifications described for concrete floors of fine texture, and concrete floors of coarse texture.

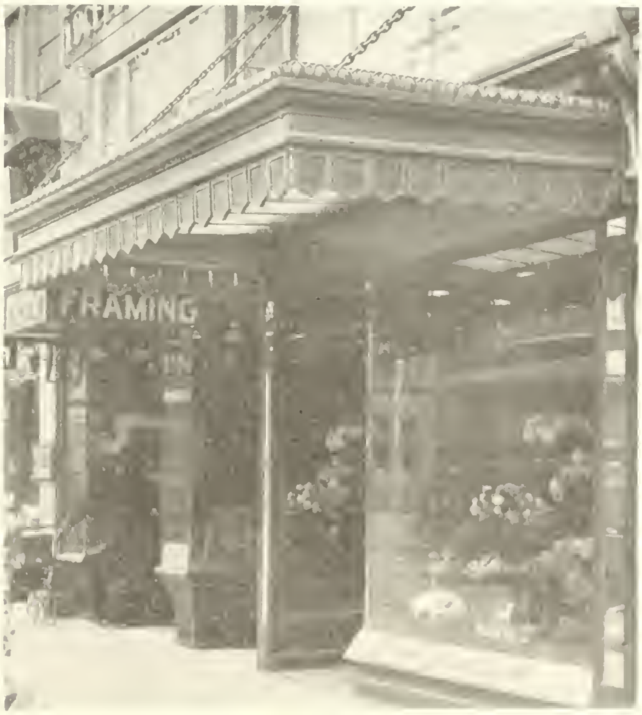
Concrete floors of normal, uniform texture should be cleaned, thoroughly dry, and well seasoned when the first or priming coat of concrete floor dressing is applied. In this instance, as well as others, the transparent floor dressing, or any other color desired, may be used, and it should be applied by means of a brush, and worked well into the pores of the concrete, spreading the surplus well over the floor surface to develop a thin film.

Floors which are laid in colors, such as terra cotta, green, etc., or where inert colors are mixed throughout the cement veneer or wearing surface, after being thoroughly cleaned, dried and well seasoned, should be given two coats of transparent floor dressing, applied under the same conditions as is described for the normal or uniform texture.

A fresh method of pouring concrete for the erection of reinforced concrete buildings is being used at Vancouver, B.C., in a nine-storey apartment house at the corner of Beach avenue and Gilford street. The system consists of mixing the concrete in the usual way and then hoisting it by means of a skip to a height of about 30 ft. above the place where it is to be used. The concrete is then poured into a hopper connected with which is a pipe. The concrete flows through this pipe by means of its own weight to the point where it is to be used. The end of the pipe is swivelled so as to permit of its being brought to bear on any part of the building. There are several advantages claimed for this system over any previously used, one of the greatest of which is that the concrete flows with such force that it packs in the molds very much more tightly and evenly than was the case when the concrete was poured from a short distance into the molds. Another advantage is the saving in time, and by doing away with a large number of wheelbarrow men a great saving in wages is also brought about.

Attractive Store Fronts

In the larger Canadian cities there is increased evidence of a growing appreciation of the value of an attractive store front. It is regarded as one of the important factors in modern business-getting. With this in mind we have pleasure in reproducing herewith a photograph of the canopy over the front of the Simmons Flower Store, Toronto. This canopy is an example of what has developed in the Luxfer Prism Company's combination of their glass and iron works, a department which was started within the last four or five years. Up to that time the company's activities had been confined almost exclusively to glass work, and orders for iron work were placed outside. Experiencing some difficulty, however, in getting their orders filled satisfactorily, the Luxfer Prism Company established a small separate department. Business developed rapidly and the company has been particularly successful with these canopies. They constitute a valuable decorative feature, the glass and iron work lending themselves to varied treatment in design.



Store front and canopy, Yonge Street. Toronto

Laying a Large Intake Pipe in Deep Water

The new intake for the water supply of the city of Montreal consists of double lines of 72 in. lock-bar steel pipe, laid on the bottom of the river from shore to the intake piers built in the St. Lawrence River just above the head of the Lachine Rapids where the water has a very swift current and is 32 ft. deep at high water. Trenches from 7 to 10 ft. deep were excavated in the very hard, compact sand by a 2½-yd. dipper dredge moored by spuds and anchored by two 1-in. steel cables and one 1¼-in. cable.

The pipe, 9/16 in. thick, was manufactured in 28-ft. lengths by the Stewart Loyd Company, Glasgow, Scotland, and at the site was riveted up on shore to 140 ft. lengths with butt-strap joints. The ends were closed with temporary wooden bulkheads and the pipes were rolled from the wharf, dropping about 5 ft. into the water and were towed to position. They were lifted clear of the water by two floating derricks, the bulkheads removed, and were then lowered into the trench where they were connected by divers who united them with gasketed flange joints. The joints were made up with bolts inserted by the divers who fitted the nuts to them and set ratchet wrenches on them operated by lines from the boats above.

Each of the double lines of pipe were connected to a 22 x 62-ft. concrete intake pier 30 ft. high which was built after the pipes were laid. Open caissons, with 12 x 12-in. timber walls, were floated to a position, filled to a depth of 4 ft. with concrete, and sunk in pits dredged to solid rock. The caissons were pumped out and the concrete piers built in them in the usual way in forms, 8 ft. in diameter, with holes left opposite the ends of the intake pipes.

Sections of 6-ft. steel pipe 12 ft. long were set in the pier openings, projecting into the interior walls, and the movable outer walls of the caissons were detached and floated away. Divers descended outside the intake piers and connected to the short pipes tackles which were operated by floating derricks to lift them and connect them up to the ends of the previously laid lock-bar pipes. The divers then sealed up the annular space around the pipes and both faces of the pier walls, after which the space around the pipe in the wall was grouted through holes left for that purpose in the concrete. The pipe in the trench was protected by a covering from 1 to 4 ft. deep, thus completing the work in about 4½ months with an average force of 50 men. Mr. George Janin is the city engineer, Mr. Thomas G. Lesage is the superintendent of waterworks and Laurin & Leitch, Montreal, were the contractors.

Irrigation Methods of British Columbia

The irrigation systems of British Columbia may be classified as follows: 1, open main canals with open laterals; 2, open mains with pipe line distributaries; and 3, pipe lines for both mains and laterals. To the first class belong the irrigation systems at Keremeos, Penticton and Walhachin and parts of the White Valley, Summerland and Naramata systems. The Kelowna irrigation system is an example of the second class and the Fruit lands system near Kamloops. The Kaleden system and part of the Summerland system are of the third class.

The cost of installing the open ditch system is, of course, less per acre than that of either the wooden flume or the wooden pipe system. The cost of maintenance of wooden flumes with a life of eight to twelve years is estimated at twenty per cent. of the first cost; that of wooden pipes empty part of the time, with a life of ten to fifteen years, is estimated at fifteen per cent.; and for wooden pipes always full, having a life of twenty to thirty years, the cost of maintenance is estimated at eleven per cent.

Permanent construction has been adopted to some extent by the Kelowna Irrigation Company, South Kelowna Company, and the Fruitlands Irrigation & Power Company, with an expenditure of from $50 to $100 per acre. When the present systems come to be renewed it is believed that steel or concrete pipes or flumes will take the place of most of the cheaper construction now in use.

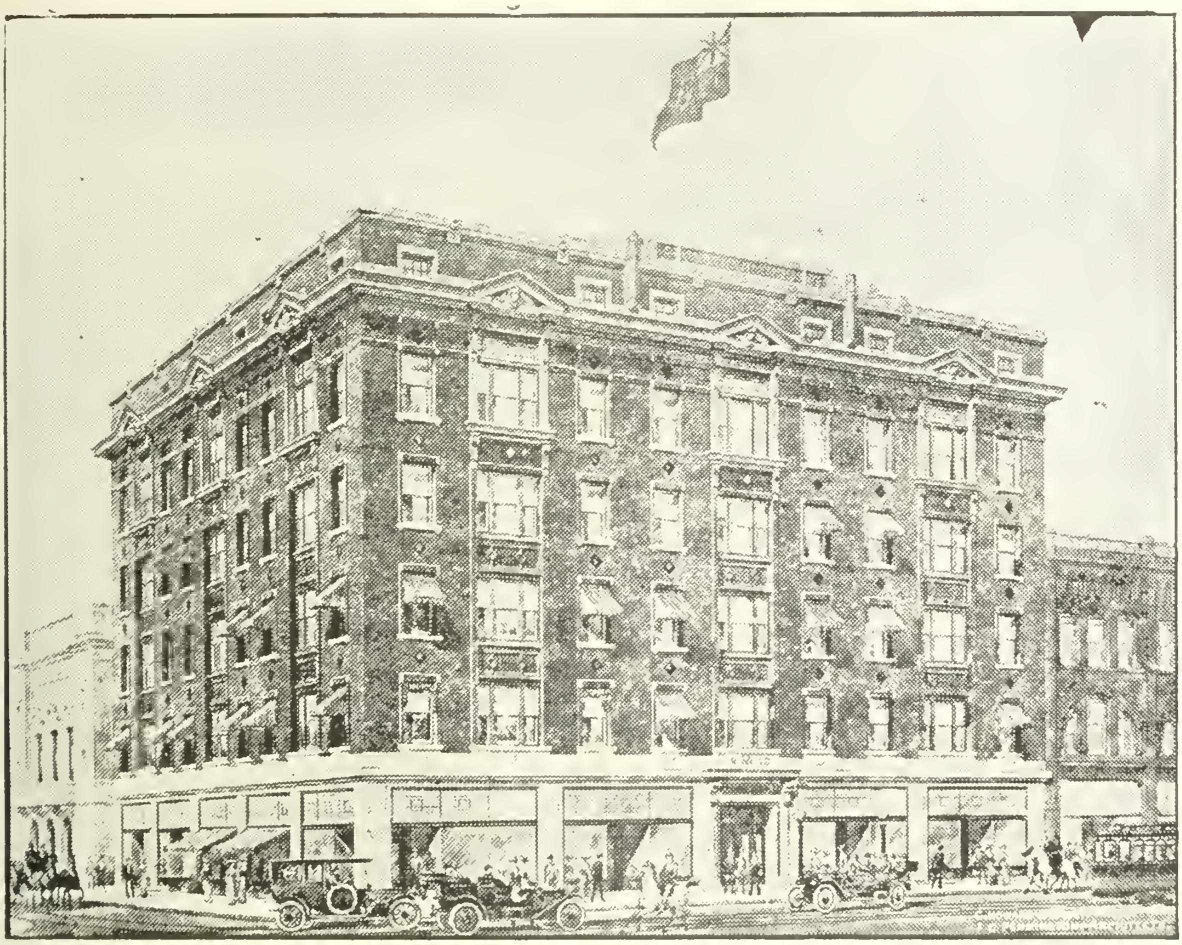
Masonic Temple Building, Windsor, Ont.

THE new Masonic Temple Building at Windsor, Ont., plans for which, prepared by Messrs. Crane & Pennington, are reproduced herewith, is being built by the Canadian Frost Winchester Company, of Windsor, at a contract price of $110,000. The building is of reinforced concrete construction, 92 by 100 ft. in dimentions, and contains six storeys and basement. The first floor will be devoted to stores, and the second, third and fourth to offices. The fifth and sixth floors are set apart for lodge purposes, an auditorium and club rooms. Excavation was commenced at the beginning of November and good progress has been made to date.

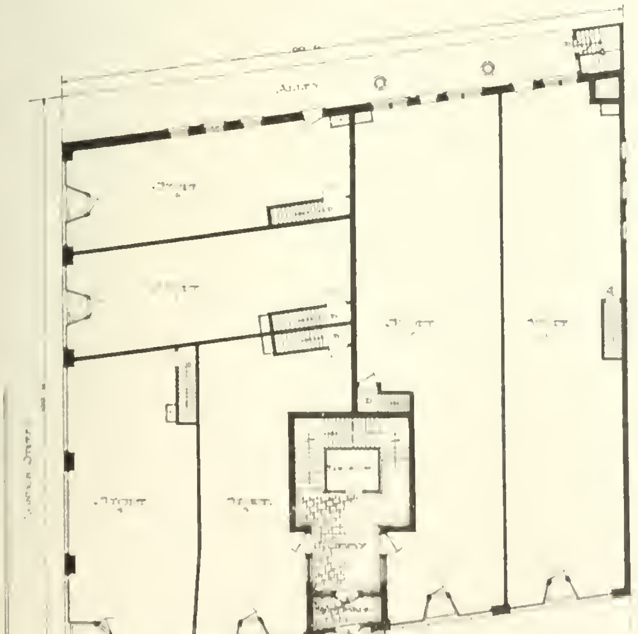
Reinforced Concrete Pontoon, Manchester Ship Canal

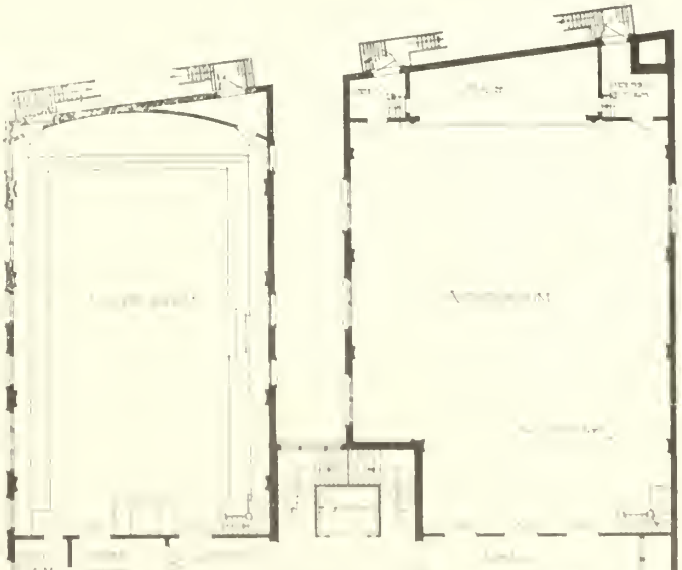
Dredges at work on the Manchester Ship Canal discharge into hopper barges which transport the sludge to points where it can be properly disposed of. In order to spread the sludge on low lying land near the banks, a concrete pontoon has just been constructed and equipped with pumps capable of pumping the sludge from the hopper barges and distributing it to the area selected for its reception. The pontoon is 100 feet long by 28 feet wide by 8½ feet deep and draws 6½ feet of water when loaded. The pontoon is divided transversely by four watertight bulkheads and longitudinally by two, one on either side of the engine room. The boilers of the Scotch marine type, weigh 58 tons and rest on three foundation cradles. A concrete post or bollard at either end is provided for towing purposes, while steel bollards are used for mooring. The pumps, engine and winches weigh about 43 tons, and as this weight is mostly on one side of the pontoon it is counterbalanced by water ballast in the compartments on the other side. The concrete of the outer shell is three inches thick, increased to four inches beneath the coal bunkers and engine room; the bulkheads are 3½ inches thick, the main deck three inches and the upper deck four inches. Preliminary work was begun on the pontoon August 4th, 1911, and the concrete work was completed March 9th, 1912.

Reinforced concrete pipe for culverts on the Atchison, Topeka & Santa Fe Railway costs $0.65 per foot for 12-in. diameter to $3.25 per foot for 48-in., varying proportionately between, according to a memorandum furnished by Mr. J. F. Parker, general foreman, to the American Railway Bridge & Building Association. The road has used culverts of this type for two years. The pipe is handled from the cars to the ground by ropes.



Proposed Masonic Temple Building Windsor, Ont.—Architects, Messrs Crane & Parrington





Bridges and Culverts in Highway Work

Fundamentals of Design and Construction—Types of Structures Field Inspection Care of Bridges—The Engineer's Services*

By W. A. McLean, Engineer of Highways for Ontario

HIGHWAY bridges and culverts, in design, method of construction and supervision, and economic features, form an important and interesting department of highway engineering. Technical skill and training of a high order are involved, originality and inventive power may be freely drawn upon, and on occasion, the results may be monumental to the designer.

The distinction between a bridge and a culvert is not, in the writer's experience, clearly defined. A bridge is commonly associated with a crossing over a living stream, while a culvert suggests an artificial channel or drain through or under an embankment, length of span and design being distinctive features. The number of bridges of fifty feet and upwards is usually very limited, as compared with culverts or bridges of ten feet or less, which are innumerable. In ordinarily rolling country every mile may have from one to a dozen or more culverts. Bridges are over the few larger streams only, into which the many small watercourses converge. While each bridge of fifty feet span may cost as much as one or two dozen culverts, yet the larger number of culverts to be maintained makes them, in the aggregate, an important item of expenditure, and often much more than a municipality's total outlay for larger structures. Culverts or short bridges are, therefore, from the standpoint of cost, as deserving of careful attention as are the longer structures.

An elemental form of bridge consists of two wooden beams laid across a stream, and supporting a plank floor. To obtain greater strength than simple beams will give, it is necessary to replace them with trusses or an arch. The simplest form of truss is a single triangle, the sides of which are stiff, straight members fastened at each angle, the inherent property of such a shape being that, unlike a figure of four or more sides, it is of rigid and unalterable form. A bridge truss, as ordinarily understood, is a framed structure, made up of a series of triangles so connected as to act as a single body. An arch, instead of a single horizontal beam across a stream, may be compared to a series of inclined beams so arranged under loading as to convert the bending stresses into compressive stresses.

General Types of Bridges

The general types of steel bridges preferred under the standard specifications of Ontario are:

(1) Rolled beams for spans up to 35 feet.
(2) Rivetted low trusses or girders for spans of 35 to 90 ft.
(3) Rivetted high trusses for spans of 90 ft. to 250 ft.
(4) Pin-connected or rivetted trusses with inclined chords for spans of 200 to 300 feet.

Deck spans are preferred wherever suitable, and Warren and Pratt trusses are favorably considered for spans of 35 to 200 feet; and Petit trusses for bridges over 200 feet in length.

The foregoing limiting lengths and types are not absolute, but may be varied. The design is in all cases to be such that the stresses in essential members and their connections can be fully determined. Solid concrete abutments, wing walls and piers have practically superseded stone, timber or other sub-structure for ordinary steel highway bridges.

Concrete superstructures may be classified as follows:—

(a) A simple concrete slab with or without steel reinforcement, on solid concrete walls. This style of structure is very useful for spans up to 18 feet, and may have a suitable hand-rail of concrete, steel lattice or gas-pipe.

(b) A flat concrete top or floor, carried on concrete beams below; the latter, as well as the floor, being reinforced with steel, has been commonly used for spans up to 40 and 50 feet.

(c) Heavy concrete beams on each side (resembling strong hand-rails) with a floor system of reinforced cross-beams and concrete covering. This type of bridge is suitable for spans of 40 and 50 feet and is better adapted to a higher head-room than is class (b).

(d) A concrete arch with or without steel reinforcement for spans of any length, but commonly up to 100 or 125 feet. Spandrels may be open or closed. This type of bridge is one of the most beautiful that can be erected for long or short spans. It is economical of material, but requires a strong and unyielding foundation, as settlement of the abutments is likely to cause failure of the bridge.

(e) Structures other than arches for longer spans than those indicated in classes (a), (b) and (c) may be carried on viaduct posts or bents.

Architectural Treatment of Concrete

The present is notably a bridge-building period on this continent. A vast number of wooden structures are falling to decay, and are being replaced with concrete, stone and steel, materials which will last for decades, some for centuries. It should be a matter of concern, that these permanent bridges possess architectural merit, such as will, in their appearance, give pleasure to the present users, and which will impress, as we would wish, the generations to follow.

Good architecture has always been a matter of pride to advanced and progressive nations. To this class of construction bridges belong. With splendid cathedrals, public buildings and palatial homes, they have in all ages excited interest and admiration. Many bridges, for their importance, strength and architectural beauty, have been, and are, world famous. A bridge is a prominent part of the highway, subject to special observation from the public. Bridges may in design and construction harmonize with a fine landscape, or may produce discord in a scene of beauty.

Little consideration has been given to the artistic side of bridge construction by municipal authorities having charge of the erection of bridges. It is taken for granted that questions of cost, economy, and utility are of too pressing a character in this comparatively new country, to permit any thought of the ornamental. We are learning, however, that scenery and a good appearance in any field, are an asset of value. It is fortunate that good design and good construction possess in themselves, the chief elements of beauty, so that the results have been more harmonious than efforts to that end would themselves possess. Nothing will accord with the ordinary landscape more perfectly than a well-built arch of stone masonry, however simple in design. Arches of concrete on the highway are very much of the same class. A well-built bridge, composed of stone or concrete abutments with steel superstructure, may also accord with a landscape without especial consideration having been given to ornamentation. Much could be gained if more attention were paid to the appearance of these structures, but it is very easy to run to the opposite extreme, with tawdry results. It is a short step from ornamental construction to constructed ornamentation,—the latter a very unsatisfactory substitute for severe simplicity.

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*Paper presented at the Good Roads Congress, Cincinnati, December 3rd.

Concrete is a material which lends itself to easy manipulation, and much can be done by moulding it into graceful outlines. In doing this there should be no attempt at imitating other materials. The imitation of rock-faced stone so often seen in concrete blocks is extremely crude. Fussy ornamentation should be avoided. Concrete lends itself to distinctive and original treatment in the direction of panelings, mouldings, and graceful outlines, based on proper methods of construction.

Bridge engineers can profitably study architectural design, particularly as instanced by the finer stone and concrete bridges of Europe. Architectural details and proportion are too frequently overlooked. The proportioning of hand rail to the size of bridge, should be carefully considered. Coping courses of arches should be sufficiently prominent, and should be slightly arched, otherwise they will appear concave. Wing walls should if possible be curved to give a greater appearance of strength. The spacing and placing of spindles, and their design, will add or detract from the merits of the bridge. Wing walls and posts should widen at the entrances to the bridge, as posts or railings standing squarely on the roadway are not ornamental.

Hand-rails of short concrete bridges are important. The public driving on the road see little of the bridge except the rail, and if it is strong and of good appearance, feel assured of the safety and good quality of the entire structure. It is desirable in such short-span bridges to extend and slightly curve the wing walls, carrying them to the top of the roadway and putting a hand-rail along the full length. For a small additional expenditure an impressive structure can be had, where the results would otherwise be commonplace if not ugly.

The failure of concrete hand-rails has often occurred through neglect of temperature stresses. Open rails should be broken into lengths of eight or ten feet, given expansion joints and the ends of each span supported on a solid post. Between the posts, spindles of various types may be used. The writer has seen a bridge of over one hundred feet in length in which much attention was given to appearance, but the hand-rails were not given expansion joints, and every concrete spindle in the bridge had been sheared. Concrete railings can be very cheaply made, if designed with ease of workmanship in view, and are vastly superior to the weak and rusting gas-pipe rails which disfigure so many concrete bridges.

A common fault in short span country bridges and culverts is that they are too short, with insufficient width of roadway. As a rule it will be found as cheap to carry tile entirely across the road, using lower head walls and widening the fill, than to use a shorter length of tile with necessarily higher and longer head walls to retain the earth fill. The clear width of roadway for short span bridges on country roads should ordinarily be at least twenty feet, as narrower roadways have an element of danger, and, in appearance, are an obstruction rather than a continuation of the roadway.

Surface treatment of concrete is important. The surface should be a part of the concrete itself. A mere plastering of a defective surface will not permanently remedy the defect. In securing a good finish, the form-work should be dressed and closely fitted. The concrete mixture should be wet; should contain sufficient sand and should be carefully spaded against the form, so as to avoid air holes and cavities. A good finish can be obtained by using fine granite in the surface mixture, this to be treated with acid or brushed with wire before the concrete has fully set. This treatment is not practicable except for special work, but in all cases a smooth and close grained surface can be obtained by using sufficient care. The practice of making the exposed surface of stronger concrete is good, and is readily accomplished by carrying up a board a few inches inside the surface to retain the core concrete until it is partially set, when the board can be removed and the surface concrete put in place. The marking or moulding of concrete to imitate stone or other material is never a success. Concrete is a strong and durable material, capable of good treatment, and should frankly stand on its honest merits.

Life of Bridges

A covered timber bridge with heavy oak stringers, erected at Napanee, Ont., in 1840, was replaced by a steel structure in 1910, after a life of seventy years. Many wooden bridges with covered trusses, have been in use for twenty-five years. The ordinary wooden truss bridge or culvert as now built, rarely lasts more than ten years. Lumber now obtainable is inferior, the price constantly advancing, and workmanship is less reliable. Repairs are needed every year, and the cost of these, in sending men and material for necessary details of maintenance, such as putting in a new stringer, plank or post, very soon runs up a bill equal to the original cost of the bridge.

On old turnpikes built in stage coaching days, the remains of many very fine arches are to be found, but in the neglect which accompanied the era of steam railway building, these old structures, without pointing, have in many cases fallen to ruin. Within the writer's experience, wooden bridges and stone arches are, with minor exception, giving place to steel and concrete, and modern bridge building involves almost wholly a consideration of the latter materials.

Structural steel as now used is practically a new material. It is little more than ten years since it has wholly superseded wrought iron. No structural steel highway bridges have been erected long enough to fully determine their life. In any event, their life is dependent upon the quality of the bridge and careful maintenance. Light or otherwise inferior structures, put up by incompetent makers, have failed within a year, or have required stiffening and strengthening.

While the life of steel bridges has not been fully indicated by experience, yet present knowledge would suggest that, for ordinary highway service, with proper strength of construction and subsequent attention, they may be expected to last for from forty to fifty years. Under railway traffic the life is short as the strain is greater, and the corrosive effect of coal smoke is very destructive. Steel bridges require attention to maintenance in the matter of painting, tightening, putting in new rivets, but this can be done periodically, and in a comprehensive manner, so that the cost of repair is not made up of time wasted in going to and from the work with men and material for trifling defects, as with timber. By using steel stringers, concrete floors, and concrete abutments, a large measure of durability is attained.

The ordinary life of a concrete bridge is as yet not known. Much will depend on the design and workmanship. Many poorly designed structures may have to be replaced after very limited service; but granted good design and workmanship, it is difficult to see why a bridge of that material should not endure for centuries, nor is there reason to doubt the great durability of steel reinforcement, provided the steel is properly protected, and the designer has not placed too great reliance upon it in caring for tensile stress.

Traffic and Loading

The traffic which bridges are required to carry has been greatly increased in recent years, and still heavier loading may be anticipated. Traction engines of six or eight tons with threshing outfits are the greatest concentrated load which many bridges now carry, but with the improvement of roads, the concurrent growth of motor traction, rural highways, especially those carrying inter-urban traffic, must be designed for heavier loads. A motor truck itself weighing six tons, is capable of carrying an equal load, or twelve tons in all, two-thirds of which is concentrated on the rear axles. Each wheel thus carries four tons, a load which floor systems should be designed to support. In England inter-urban traffic shows instances of steam trucks with loads aggregating forty tons in weight.

Shop Inspection of Steel

Shop inspection is important for all steel bridges. The engineer employed by a municipality could rarely do this personally, but can employ an inspection company. Inspection companies make a specialty of this work and the charge is usually small, about fifty cents per ton of steel.

When steel reaches a bridge company's works from the rolling mills, it is usually piled in an open stock yard where, for the period of storage, it is exposed to the weather. When required for a bridge it is taken into the shop, and the first operation should be to run the plates and flats through horizontal rollers to straighten them. Wooden or cardboard templets, previously prepared in the templet department, are then laid on the steel, and rivet holes and other dimensions are marked off, after which the steel is taken to the shears, coping machine or punches. The steel should be again straightened if necessary to remove distortion created in punching or shearing, and contact surfaces given a coat of paint. Angles and plates are then assembled to form the various members, placed on the rivetting horses or skids, and rivetted together. The members, as completed, are given to the painters, to receive a shop coat of paint. When it is specified that field connections are to be shop assembled and reamed, the truss is laid out flat, each member in proper position, the required camber is produced by opening or closing splice joints of the bottom chord, and the field connections are then reamed out. The several members are then match-marked for field erection, and are ready for shipment.

Throughout this process are many points for which careful shop inspection should be provided. Some bridge companies paint their stock as soon as received from the rolling mills, while others do not. Material which has been in stock for a considerable period and, unprotected, has become pitted and corroded, should be rejected. It should be seen that material is properly straightened when taken from the stock yard for fabrication, a rolling operation which is omitted in some bridge shops. Templets should be checked over to see that they are correct and according to the plans. They should be made to lie flat on the steel, and without distortion, when the steel is being marked for punching and cutting. In punching rivet holes, special supervision should be given to the punches and dies, to see that they are such as will produce a sharply punched hole, with almost parallel sides, and within the specified clearance. For work of the best class, rivet holes should be punched smaller than necessary, and reamed to the required diameter. If this work is left until the members are assembled, the reaming, in addition to removing the crystallized steel caused by punching, will correct slight inaccuracies making rivet holes coincide, and permitting a much higher quality of rivetting. Workmen dislike to handle steel newly painted, and are apt to neglect the painting of contact surfaces before assembling. Size and shape of rivet heads are largely dependent on the condition of the dies, and the latter should be carefully watched; sufficient force should be provided in the case of pneumatic rivetters to properly enlarge the shank and produce a full, round head. All rivets should be tapped to see that they are tight, and it should be seen that they are in proper alignment. With good rivetting equipment, the percentage of bad rivets is very small, but with hand-driven rivets, it may be as great as fifteen per cent.; all of which should be removed by order of the inspector.

After rivetting, it must be seen that a proper quality of paint is used, not merely a coloring material; and that defects such as open joints, cracks, mis-punched holes and rolling-mill defects are not covered up by paint, paste and contact, they should be faced exactly, and at right angles to the axes of the members, by means of a rotary planer. putty. To bring top chord and compression joints into close All these are details which large bridge shops are apt to neglect if proper shop inspection is not provided, or for which the smaller shops may not be equipped.

Field Inspection of Steel Bridges

Field inspection under the engineer should commence with the transportation of the material from the railway to the site of the bridge. Care should be taken to see that the steel is not carelessly handled or piled so as to cause distortion. Long members should not be allowed to project so far behind the wagon as to become bent, and material should not be dumped roughly from the wagon; nor should the steel be allowed to become covered with sand, as there may or may not be difficulty in having it cleaned off before painting. Any material damaged in transit should be rejected when such damage consists of sharp kinks. Slow bends only should be rectified in the field, and in no case should a member be heated for this purpose. The straightening of a built member should not be permitted after the parts have been rivetted together.

Falsework should be strong and rigid, and the camber blocking, carefully adjusted; without which the several parts will not assemble accurately, and drifting, with distortion of rivet holes will be necessary. Proper alignment of trusses, close contact of compression joints, tightening of tension members, clearance at the expansion and of the bridge, full bearings for steel joists and truss shoe-plates are important details to enforce. The inspection of field rivetting is exceedingly necessary. Hand driven rivets can be made as tight and as well formed as shop rivets, but this has usually to be urgently insisted on by the engineer.

Bridge Flooring

Plank floors on steel bridges commonly wear out in from two to four years, and are a constant matter of expense for repair and renewal. The tendency for bridges under the writer's control, is to use concrete flooring. The latter material, however, is heavy, adds a considerable dead load to the bridge, and largely increases the weight of steel required in the trusses. A problem for frequent consideration by the engineer, arises in determining for a given site, the relative economy of a light steel bridge with wooden floor, or a heavier bridge carrying a concrete floor.

Where traffic is infrequent, and loads will not exceed six or eight tons; where future increase of traffic is improbable, the lighter structure with wooden flooring may give the better service. Where loads approaching that of a ten-ton roller will be carried, or where motor truck travel may be anticipated, wooden flooring is not strong enough for the concentrated load, and better results are had from a concrete floor system. For short spans the difference in expenditure is not great, but for spans of great length, careful analysis of cost should be made.

The solid concrete floor has advantages, in addition to a more durable wearing surface, particularly the extent to which it distributes the concentrated load. With a plank floor, the weight of every vehicle passing over it is transmitted to the individual members of the bridge, causing a constant jarring and distortion that is very destructive to the joints and connections. With concrete, on the other hand, the weight of a passing vehicle is spread over a greater area of the bridge structure, the floor being a monolith and distributing the concentrated load over a much greater bearing than can each plank. In this way the injury to bridges is much less with a concrete than with a plank floor.

So much is this the case that, with a concrete floor, it is not necessary to restrict the speed of vehicles travelling over it. With a plank floor it is always expected that horses will not be driven over the bridge faster than a walk. But with concrete floors, travel is not interfered with, and horses may be driven at any pace.

Painting Steel Bridges

Rust is the chief destructive agency of steel highway bridges. Railway bridges are greatly injured by the vibration caused by heavy moving loads. Frequent and thorough cleaning and painting are necessary to the preservation of steel highway bridges. If they could be fully protected from rust, steel highway bridges would practically last forever. It is found that painting is required about once in five years; oftener if the bridge is in a much exposed situation by the lake shore or sea coast.

Before painting steel, the surface should be absolutely free from rust, scale, moisture and grease. Rust is removed by scraping with steel scrapers; and scale, by the use of stiff wire brushes, or more effectively by use of the sand-blast. Rust left beneath the paint will spread, in time the paint will flake off, and the metal is then wholly exposed to the destroying action of air and moisture. As portions of the metal in a bridge are only one-quarter and five-sixteenths of an inch thick, it is evident that rust, acting on both sides, can greatly weaken the structure. Connections, too, require special care, to see that they are fully protected. Bridge companies rarely exercise sufficient care, when erecting a bridge, to see that the scale is fully removed and the bridge properly painted.

The materials commonly used in painting bridges are red lead or red oxide mixed with linseed oil. All are subject to much adulteration and care has to be exercised to procure reliable materials. Lamp-black added to red lead, will change the color to a rich chocolate, and will not injure the paint. The Standard Specifications of Ontario provide that, while other materials subject to approval and test may be used, the paint used shall consist of red lead, lamp-black, and pure raw linseed oil. The shop coat shall contain twelve pounds of red lead, eight ounces of lamp-black, and one gallon of linseed oil; the first field coat to be fifteen pounds of red lead, thirteen ounces of lamp black and one gallon of linseed oil. Each coat is to be thoroughly dry before the next is applied. The red lead and lamp black shall first be mixed dry, the linseed oil added, and the mixture stirred to a uniform consistency, and maintained at such consistency by frequent stirring during application. Only a sufficient quantity for immediate use shall be mixed at once. Thinning and drying ingredients will not be allowed.

Circular Culverts

Culverts up to three feet in diameter are now being commonly made of concrete tile. When properly made and laid, they are very durable and, where suitable material is available, of low cost. Where material for concrete is not convenient, corrugated iron culverts are very often well adapted to certain situations.

It is especially necessary that concrete pipes be strongly made, with the materials well mixed, the cement of a good quality, the thickness of concrete ample and proportioned to the diameter, a sufficient covering of earth when laid, and the size of tile large enough for the flow of water.

These culverts should not be made too short, especially at road intersections. It does not cost very much more to make the length ample for safety of the public, preferably the full width of the road allowance.

If good results are to be obtained from the use of concrete tile culverts, the tile must be put in place with reasonable care. It is, in the first place, necessary that they be laid with a good fall on a regular grade to a free outlet, in such a way that water will not stand in them. The tile should be laid with the spigot end down grade, and the joints made tight with cement mortar. If the joints are open, water is likely to work along the outside of the culvert, and finally make a considerable channel, which will allow the culvert to get out of line and finally result in a "cave in." To prevent the water finding its way along the outside of the pipe, the ends should be protected with concrete or stone head-walls.

A concave bed should be excavated for the pipe to rest in, thus securing an even bearing, without which a heavy load passing over before the culvert has properly settled into place may burst the tile. Tile cannot be used for very shallow culverts, but must have a sufficient depth of earth covering to protect them from the direct pressure of heavy loads. At least a foot of earth over the top is advisable in every case, but for culverts of two feet in diameter or over, this should be increased to eighteen inches.

The earth should be well packed and rammed around the tile to secure a firm bearing, and light soils should be used immediately over or around the culvert. A heavy clay, a firm gravel, or a compact sand will answer, but vegetable mould, fine sand and light loams are subject to washouts.

At the outlet, the culvert should be set nearly flush with the surface of the ground. If set higher than the surface, the fall of water will wash out a depression, and in time will undermine the end of the culvert. A too rapid grade will have the same effect, and it is well to cobble-pave an outlet where this undermining action is likely to occur. The diameter should be sufficient to carry the maximum flow likely to occur in a term of years, otherwise a wash-out will sooner or later result.

Concrete Construction

Concrete construction (while progress may be made in the future), has passed into stages of standard methods, and is no longer experimental in so far as assured results are concerned. Past discussion has centered around the relative values of broken stone and gravel; wet and dry mixtures; methods of mixing, types of reinforcement and other details which belong to general practice, and need not be considered in this paper.

Whatever specification is determined upon, however, it should be carried out with intelligence, and in good faith. To this end, capable inspectors are necessary. Carefully drawn plans and specifications are of little value if their interpretation is left to men who have no proper knowledge of the properties of Portland cement and its use. Inspectors should be selected by the engineer, and should be carefully instructed before being placed on the work. Inspectors appointed by Boards of Works because of their political or other allegiance can rarely be expected to develop the skill, interest and enthusiasm that properly belong to the position, and which are essential to best results. The writer has in the past found young engineering students of the second or third year to be in many respects well qualified, while the experience and training is of much value to them and ultimately to the public.

Better results could in many cases be had, were engineers to give more attention to form work. Too frequently this is left to the rule-of thumb methods of the foreman or contractor, whereas it is of vital importance that forms of adequate strength and of exact dimensions be provided if the strength and beauty of the structure are not to be jeopardized. Economy and perfect results will be greatly facilitated by detailed drawings for well designed centres and forms.

Provision for Cost

The repair and removal of small bridges and culverts during the timber or plank period of construction has purely agricultural districts, been a serious drain on municipal resources, but the policy now being adopted of replacing these with concrete or other permanent material is one which, in the near future, promises to relieve tax-payers of this annual expenditure, and permit the outlay to be directed to more necessary road building.

Some municipalities, with commendable desire to avoid public debt, are burdening themselves, and delaying progress, in order that all bridges and culverts may be built by annual levy. Where permanent material is used, construction carried on under proper supervision, and repairs provided for, there is every justification for borrowing money to build bridges of steel or concrete, extending payment over a term of twenty or thirty years. In this way those who benefit hereafter will contribute to the cost, and those who use them to-day are not unduly burdened.

This does not apply (it must be emphasized) to flimsy steel trusses, weak concrete structures, wooden floors and substructures of steel legs, steel tubes and wooden backings; but only to those in which the greatest degree of permanence and strength is provided with a view to future traffic demands. The future should not be burdened with charges for which they derive no service.

Road building has, in the past, suffered much by this annual demand for culverts and bridges. A decayed bridge, or broken culvert must of necessity be replaced or repaired, while the road, if at all safe or passable for a part of the year, can wait. It should not be forgotten that, while bridges are necessary, they are only a short part of the highway; are only built because of the highway, and are an unfortunate necessity. Users of the road may pass over a bridge or culvert in ten seconds, while it may take ten minutes or longer to drive over a mile of road. The writer has found many localities in which excellent bridges are being built, but in which the roads proper are in a neglected state. Good bridges should be accompanied by good roads, and every councillor may feel assured that the community which will sanction expenditure for permanent bridges, will with equal good will sanction the cost of good roads when shown a model of what well directed expenditure will do in that regard.

The Purchase of Bridges

The purchase of a steel bridge may be made through an engineer or engineering department; or as is very commonly the case, a municipal council or bridge commission carries on negotiations without the services of a qualified engineer.

In the latter case, a common practice is for the council or commission to determine the span of the bridge, and advertise for tenders, stating perhaps, that the bridge is to comply with certain general specifications, or is to be strong enough to carry a stated load. Representatives of the bridge companies interview the members of the council or the commissioner, tenders with or without strain sheets are received, at the appointed time are opened, and the contract is awarded often on the basis of lowest tender alone. Under such practice the writer has known a difference of $5 in the tender to cause a council to authorize a contract for a bridge of $500 less value, with no guarantee that the bridge would be built even as the tender specified. The service of a competent engineer, costing from 5 per cent. to 7 per cent. of the price of the bridge, would have doubled the life of the structure and given a much greater assurance of safety to the public.

Councillors cannot be expected to judge as to the qualities of a steel bridge, as they can of timber, with which they are all familiar. For steel and concrete bridges they are fully justified in obtaining proper engineering advice, or rather, a council is not justified in doing otherwise. Steel bridge design requires a mathematical training such as only engineers possess.

An engineer's services in the erection of steel bridges will usually consist of:—

(1) The examination and measurement of the site of the bridge, changing the location if advisable, determining the number of spans, material and type of bridge.

(2) Preparation of plans and specifications and taking tenders on a uniform basis for abutments and piers.

(3) The preparation of specifications for the steel superstructure, with such plans as may be required.

(4) Preparation of notice or advertisement calling for tenders for steel superstructure, so arranged that all companies will tender on a uniform basis.

(5) Scrutiny of the plans and tenders submitted by the bridge companies, and advising council as to the most satisfactory.

(6) Such inspection of the bridge during construction as its size and importance may render advisable, and arrangement for shop inspection.

(7) The inspection and final acceptance of the bridge upon completion.

Forms of tender and specifications should always be carefully drawn so that every contractor or company will tender on a uniform basis; and parties tendering should know that construction will be under an engineer who will see that inspection throughout will be careful and complete, and that all details of the agreement are complied with. The engineer may prepare detailed drawings of the steel, or may accept those submitted by a bridge company. Either practice is satisfactory if the specifications respecting design are well arranged and the engineer checks the plans thoroughly to see that the specifications are complied with by the plans of the successful bidder. To meet this condition, the Provincial Highway Department of Ontario has prepared general specifications for highway bridges which fix standards for the province.

The writer has no wish to speak slightingly or unfairly of the well-intended efforts of many councillors to be economical and keep down municipal expenditure. They have been in the habit of themselves designing and building wooden bridges, and both they and the public have to discover for themselves that, in handling steel and concrete, they are entering a new field requiring specialized training and experience, and that a wider economy dictates the employment of engineers for this work. They may have at some time, employed a local or other engineer with discouraging results. Engineers in many localities have, in the past, found so little demand for their services in this regard that they may not, in all cases, have kept prepared for this branch of professional work. Even engineers require experience; but given experience, they are able to apply it to better advantage than is the layman. When municipal councils and the general public learn, as they are steadily doing, the advantages of specialized services in bridge construction, the engineering profession as represented by local practitioners will respond to the opportunity.

State Influence

At the inception of the work of the Highways Department of Ontario, it became evident that municipal councils and the public needed education in relation to bridge building. Bridges and culverts to that time had been very commonly built of timber, iron and stone, but steel trusses, concrete abutments and concrete arches were coming into use. Plank culverts had been built without plans under the direction of pathmasters, and wooden bridges were being erected by local carpenters and builders. A prejudice existed against the employment of an engineer in any capacity, and the public and municipal councillors were slow to recognize that steel and concrete were materials demanding technical training as well as practical experience.

To meet this situation the Highways Office prepared plans and specifications upon request, free of charge, in so far as the staff limitations would permit. This assistance encouraged many councils to commence a permanent type of construction where timber would otherwise have been used; and the public were given practical models of durable structures. With this instruction, the Highways Office was enabled to impress the fact that, to the successful use of steel and concrete on any but the smallest scale, the services of a trained engineer were necessary, not only to prepare plans and specifications, but to superintend the letting of contracts and erection.

Criticism on the part of engineers was at once offered. The giving of plans, free of charge by the Provincial Office, it was argued, was trespassing on the rightful domain of private practice. The Highways Office was able to reply that the same objections had previously been raised to similar procedure respecting road and street construction, but that the net result had been to largely increase the demand for engineering services in paving and road work; that a similar result was anticipated in the matter of bridge building.

Later experience has fully justified this policy, and in bridge building as in road construction, civil engineers are being much more largely employed, for councils and the public are learning that even standard plans for short spans need the skill of an engineer to adapt them to each situation, and to guide their erection under either contractors or foremen. The municipal code now requires that all county bridges shall be designed and built in accordance with the general specifications of the chief engineer of highways for the province, to whom plans for important structures are also submitted. Without the efforts of the Highways Office in preparing plans as an educational work, the existing requirements of the Municipal Act would have been impossible. The ideal condition has not yet been reached, and inferior bridges are still being erected, but the educational effect of good design and supervision, assisted by failures and wash-outs where these are lacking, is steadily having a beneficial influence. Greatly improved bridge construction has been effected, the public are more and more recognizing the necessity for engineering services, and the engineering profession of the province are, and have every reason to be gratified, as the demand for their services in this regard has been greatly extended. Reputable bridge building companies are in sympathy with the movement, as the basis of design is fixed, and they are not compelled to erect flimsy structures in competition with other companies willing to carry on that class of business.

From experience in the province of Ontario the writer is of the opinion that state and federal highway departments can exercise a most beneficial influence on highway bridge construction, to the manifest advantage of the ratepayers who pay for the work, the travelling public whose safety and convenience are at stake, bridge companies and contractors who desire to erect creditable structures, and the engineering profession whose services in this regard are as yet scantily appreciated.

To this end, an educative policy should be followed, necessarily implying more or less gratuitous service on the part of highway departments. Compulsory approval of plans and specifications by the state highway department is also a measure which may be exercised with good results.

Messrs Darling & Pearson, Toronto, are completing plans for the new head office building which the Sun Life Assurance Company will erect next season on Dominion Square, Montreal. The plans provide for a building of classic design rising to a height of 135 feet above the sidewalk—nine storeys high. The structure will have a frontage of 138 feet on Dorchester street and 200 feet on Dominion Square.

Vancouver Firm's Activities

The Municipal Construction Company, Limited, recently completed their contract for waterworks supply and distribution for the municipality of Burnaby. Approximately fifty miles of steel pipe, ranging in diameter from 3-in. to 24-in., was laid. The contract included digging trenches, hauling and laying of all pipe and specials. The contract price was $115,000. The company are now busily engaged upon contracts for waterworks supply and distribution for the cities of Port Alberni and Salmon Arm. The Port Alberni work comprises a rock-filled timber dam and headgate on China Creek, clearing and grading five miles of road, and supplying and laying five miles of 16-in. continuous wood stave pipe, two miles of 12-in. and 10-in. steel pipe and five miles of wire wound wood pipe. The contract is for the complete system and includes all valves, fittings, pipe, etc. The Salmon Arm work includes four miles of supply main and three miles of distribution. The Port Alberni contract was obtained at $92,000, and the Salmon Arm contract at $20,000. The work at Port Alberni is progressing favorably. It is hoped to commence laying the 16-in. pipe line about January 1 and to complete the whole undertaking by April 1. The continuous stave line is to operate under a head of 220 feet. At Salmon Arm work has just started on the laying of the wood pipe for the supply main and the steel pipe for distribution. The superintendents of construction for the above work are Messrs. J. C. McKenzie and W. Stocks.

An Interesting Industrial Announcement

The Standard Steel Construction Company, Limited, has purchased thirty-six acres of land near Welland, between the Canal and the Grand Trunk and Wabash railways. This company has been financed by Canadian and American capital and has no connection with any American concern. There is in course of erection a plant which will be in operation in February next and which will have an initial capacity of about 500 tons of finished material a month. A large tonnage of stock material has been ordered for the purpose of providing material for prompt shipments of steelwork for buildings, bridges and similar structures. The officers of the company are Mr. E. O. C. Kuhnel, president, formerly manager of works for the McClintic-Marshall Construction Company, Pittsburgh, and Mr. R. W. Knight, vice-president, formerly contracting engineer for the same company. Both Mr. Kuhnel and Mr. Knight were associated with the McClintic-Marshall Construction Company since its organization in 1900. Mr. Kuhnel will act as general manager and Mr. Knight will have charge of sales and finance.

Montreal has lost one of its best known civil engineers in the person of Mr. James Shanley, who died suddenly at his residence at Prince Arthur street. Mr. Shanley was especially known in Ontario and Quebec, where he did most of his work, which was mainly connected with railway enterprises. Although born in the United States, fifty five years ago, he was practically a Canadian, having resided most of his life in this country. After graduating in Toronto University, he went to Montreal, and learned his profession under his uncle, the late Mr. Walter Shanley. Mr. J. M. Shanley was chief engineer of the line from Vaudreuil, P.Q., to Ottawa, now incorporated in the C. P. R., and was also chief engineer of Baie des Chaleurs Railway. He was a member of the Canadian Society of Civil Engineers and of the Engineers' Club. He leaves a widow and three sons and three daughters.

A Large Quarry in British Columbia

Operated by Messrs. Gilley Bros., of New Westminster—Handling and Conveying the Rock—An Efficient Plant

ONE of the largest quarries in British Columbia is owned and operated by Messrs. Gilley Bros., Columbia street, New Westminster, and is situated about seventeen miles from New Westminster on the Pitt River. The quarry comprises seventy-five acres secured from the provincial government under a twenty-one year lease.

The pit has been opened out until the face is approximately one hundred feet high. This is broken down in large quantities by drilling holes with Rand No. 43 drills, twenty-five to thirty feet deep on the top of the face and blasting them with high power dynamite. Some charges have moved or broken down 50,000 cubic yards in one blast. The large boulders are then block holed and blasted to reduce them in order that they may be economically handled. After being broken up the material is loaded in cars by a Marion Model No. 35 steam shovel, then hauled up an incline by a double drum Jenckes friction hoist and dumped into a receiving bin over the crushers. The chute from this bin into the large 36 x 24 inch Farrel jaw crusher is controlled by a finger gate.

The rock, after passing through the jaw crusher, which reduces it to 4-inch size, passes through a No. 6 gyratory crusher, closed down to 2½ inches, and is deposited on a 36-inch belt conveyor, having 90-inch centres. The conveyor conveys the crushed rock to three revolving screens, the first being 54 inches in diameter by 10 feet long and having 1-inch perforations. All material over one inch passes into a second screen by gravity. This screen is 42 inches in diameter by 10 feet long, punched with 2-inch perforations. The 2-inch material passes through the 2-inch holes into bunkers underneath. The larger crushed rock is rejected through the end of the screen into a chute carrying it into the third screen, which is 36 inches in diameter by 10 feet long, and having 3-inch holes at 4-inch centres. The material over three inches passes out of the end of the screen into a bunker so arranged that the rock may be fed into a small crusher and recrushed, or loaded on to a scow and sold for ribble rock, or overs, as they are sometimes called.

The bunkers are so arranged that the product can be loaded on scows in a short time by double chutes from each bunker or pocket. In fact a scow with a capacity of 175 cubic yards can be loaded in two hours.

The power for this plant is furnished by three Pelton water wheels, under an effective head of 550 feet. A much greater head can be secured if necessary, for at the back of the quarry is a range of hills, 2,900 feet high, on top of which there are three lakes averaging forty acres each and about twenty to thirty feet deep. These lakes are connected to each other by small streams, which have been cleaned out to allow a clear flow of water, and individually dammed, allowing regulation of the quantity of water required at the quarry. The power now consumed is about 400 h.p. for running the crushers, conveyor screens and air compressor. An early extension of the power capacity is planned and by next summer it is probable that 800 h.p. will be utilized.

The plant is considered most efficient and economical. It was designed by Mr. Geo. K. Williams, consulting engineer, and Mr. P. Munroe, superintendent of Gilley Bros.

The air compressor and drillers were supplied by the Canadian Rand Company; the gyratory crusher by the Allis-Chalmers-Bullock Company; the large jaw crusher, conveyor-screens, hoisting engine, pulley and shafting by the Jenckes Machine Company.

Messrs. Gilley Bros. own three steam tugs and a fleet of eighteen scows by which the finished product is conveyed to New Westminster, the municipality of Ladner, the municipalities of South Vancouver, Coquitlam, Point Grey, Delta, Burnaby and Richmond. The capacity of the plant averages 2,700 cubic yards a week of six days.

Canadian Railroad Development

The Canadian Northern Railway have made application to Parliament for authority to cross the St. Lawrence River at Montreal and extend the system to Point Levis, with a branch to St. Rosalie Junction, where the Grand Trunk joins the Intercolonial Railway.

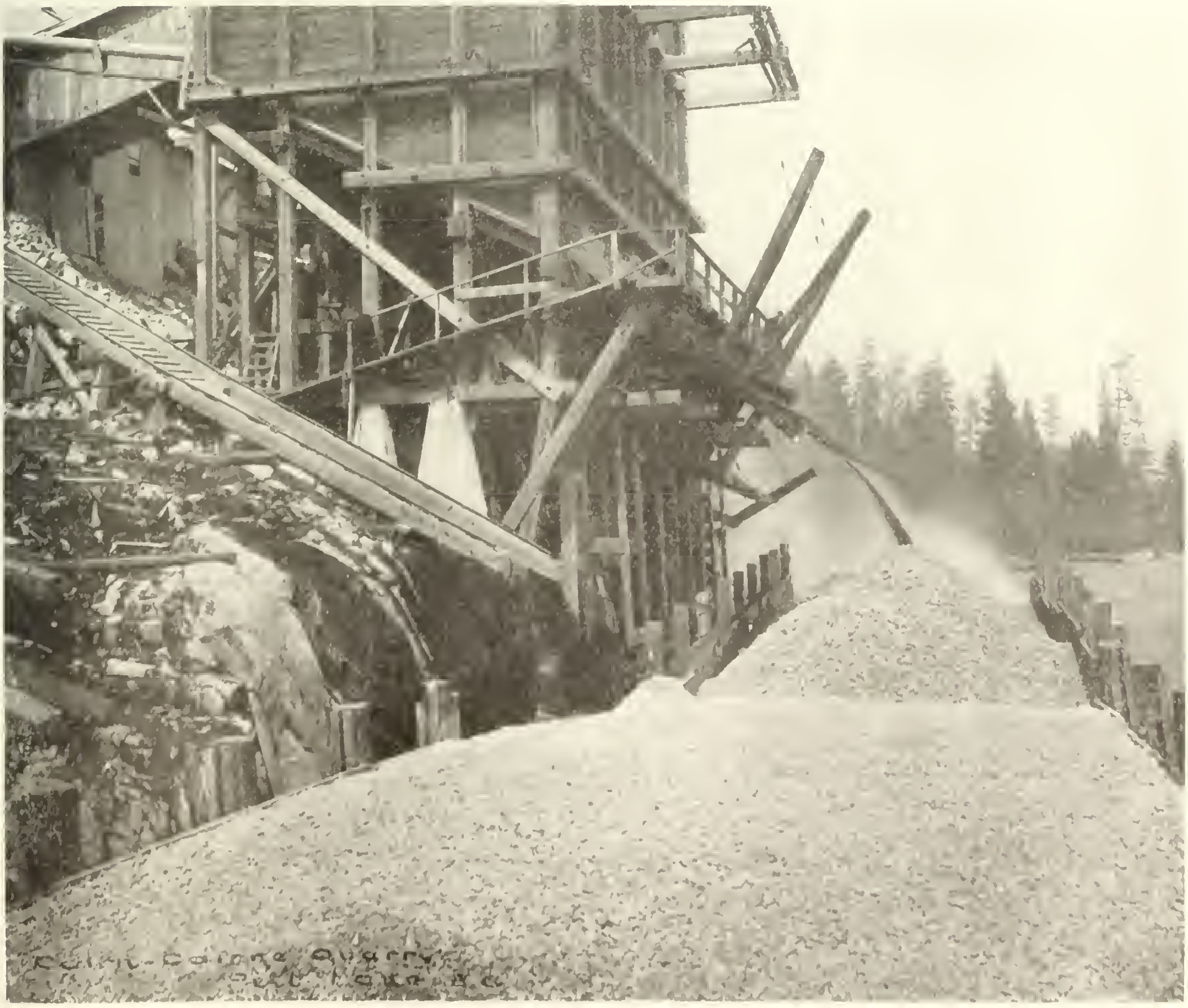
The Canadian Pacific Railway have retained the services, in a consultative capacity, of Mr. V. G. Bogue, a well-known New York engineer. This is in connection with the line through the Canadian Rockies. Mr. Bogue has lately been acting in an advisory capacity in designing the harbor improvements at Seattle, Tacoma, and San Francisco, in view of the early opening of the Panama Canal.

The Quebec, Portland and International Short Line Railway Company has been formed and has made application for a charter from the government at Ottawa at this present session. The line will commence near the village of Scotstown, P.Q., and will run along the valley of the Salmon River in a southerly direction to a point of junction with the Maine Central Railway or the Canadian Pacific Railway in the township of Eaton.

A report just received from Regina states that steel-laying on the Grand Trunk Pacific from that city has now reached a point within half a mile of Moose Jaw, and will be completed in a few days' time. Nine thousand yards of gravel must be removed before getting a service into the last named point, and it is improbable that anything will be done to this end before spring. Ninety miles of the branch south from Regina have also been completed.

The Cariboo, Barkerville & Willow River Railway Company is to apply for permission to build a line extending from a point on the Grand Trunk Pacific Railway Company's projected line of railway at Eagle Lake, thence following as nearly as possible the Willow River to the town of Barkerville, B.C., and also authorizing the construction of following extension and branch lines: (a) From a point at the southern end of the company's line near Barkerville to a point near Cunningham Creek. Thence to a point near Quesnel Forks, it will follow the general direction or valley of the south fork of the Quesnel and the west shore of Quesnel Lake to a point at or near the mouth of Horse Fly River, thence to a point near its source. From there it is planned to run to Clearwater River, thence following the general direction or valley of the Clearwater River to a point at or near its junction with the North Thompson River and, (b) from a point on the main line of the company's railway about 17 miles or thereabouts from its northern terminus and thence in an easterly direction by the most feasible route to a point at or near Bear River, a distance not exceeding twenty miles.

General view of Gilley Bros'. Quarry on Pitt River, B. C.



View of bunkers at Cairn Cairn Quarry, Pitt River, B. C.

Types of Ferro-Concrete Construction

Examples of Special Interest—Column Design—Durability of the Material—An Experiment with Embedded Bars*

By J. S. de Vesian, M. Inst. C. E.

It is not only in Great Britain that this class of construction has made such rapid strides, but throughout the whole of the civilized world. The methods of calculation adopted are, to a certain extent, based on formulae of an empirical nature; that is to say, partly derived from the practical experience of these thousands of structures, although, of course, the general principles of mechanics are unalterable. The concrete is invariably made with the best qualities of genuine Portland cement, clean, sharp sand, and aggregate, consisting of gravel or hard stone. The writer always insists on a cement with an initial setting time of 50 to 90 minutes, it being so important that the concrete shall be deposited in the moulds and well rammed before any initial set has occurred.

Reinforcement in Theory and Practice

As to reinforcement, if it were practicable to apply the teachings of theory to their full extent, the steel employed would be in the form of fine wires receiving and transmitting stress throughout those portions of the concrete selected for reinforcement. The happy mean reconciling theory and practice is obtained by the use of moderately small bars as main reinforcement, and small rods, wire or steel strips, as connecting or auxiliary reinforcement. All this steel is of the type generally described as mild steel in distinction to qualities of iron which are in this country designated high carbon steel, or hard steel. Thus the ultimate tensile strength of the metal is from 28 to 33 tons per square inch, with the elongation of at least 20 per cent. on an 8 in. specimen.

Of late years several varieties of patent bars have been introduced, either with the idea of providing merchanical bond, or where provision is made for auxiliary reinforcement at fixed points. As to the first, numerous authoritative investigations have shown that a mechanical bond is unnecessary, owing to the natural bond created between the concrete and the steel by physical and chemical agencies. With regard to the latter, the most essential point is the insertion of the reinforcement in just those places, and in those places alone, where the stress diagram of any given structure shows that the resistance of the concrete requires to be supplemented. With fixed auxiliary reinforcement, it is impossible to vary the position of the stirrups, etc., as may be determined by the calculations of the individual member. With the form of reinforcement it is easily practicable to arrange for any sectional area and number that may be demanded by the intensity and distribution of the stresses. By the adoption of the small kink in one side of the stirrup, which has of late years been brought into vogue, it is impossible for the stirrup to drop away from the main bars during the process of ramming.

The next slide shown represented the cross-section of a plain concrete beam of any suitable dimensions. In accordance with the theory of flexure of beams, the horizontal stress intensity on any vertical section of a beam varied with the distance from the neutral axis, as represented in the right-hand portion of the diagram. Under ordinary working stresses the neutral axis of a plain concrete beam is midway between the top and bottom surfaces. If stresses of 600 lb. per square inch in compression, and 60 lb. in tension are worked to, and they are permissible working stresses, it will be seen that the maximum stress that can be safely developed in this beam is only 60 lb. per square inch, in spite of the fact that the concrete is quite capable of being safely worked at 600 lb. per square inch in compression. In other words, nine-tenths of the concrete in the upper half of the beam is absolutely wasted.

If, however, two steel bars are embedded near the bottom surface, conditions are quite different. Disregarding the small tensile resistance of the concrete below the bars, it will be seen that the position of the neutral axis is now governed by the stresses developed in the concrete and the steel respectively, by the coefficients of elasticity of the two materials, and by the distance of the two bars from the bottom of the beam. Taking the working stress of 600 lb. per square inch for the concrete, and 17,000 lb. per square inch for the steel, and accepting, for the sake of argument, the average values of 2,000,000 lb. and 30,000,00 lb. per square inch for the coefficient of elasticity of the concrete and steel, and assuming the centre of gravity of the bars to be one-tenth of the total depth from the bottom of the beam, the position of the neutral axis is found by calculation to be about one-third of the way between the top and the bottom of the beam. Similarly, calculation shows that to develop the compression stress of 600 lb. per square inch in the concrete, the proportionate area of steel required is less than 6 per cent. of the total cross-sectional area of the beam. Therefore, theoretically, by using 6 per cent. of steel the working stress in the concrete in compression can be increased 1,000 per cent. Practically, the actual saving is somewhat less, owing to the higher position of the neutral axis, and consequently a smaller proportion of the concrete acts in compression, and also because no account is taken of the tensile resistance of the concrete; but allowing for these circumstances, the net economy secured by the addition of reinforcement in the manner described is fully 600 per cent., a saving which brings the cost of a ferro-concrete beam to between 15 per cent. and 20 per cent. below that of a rolled steel joist of equal strength, apart from the cost of painting, plastering, or fireproofing.

In addition to straight tension bars, such as have been considered, a beam of a most simple type contains other bars, straight for a portion of their length, and bent upwards at either end. It includes also a number of vertical ties described as stirrups, and illustrated previously. Near each end of the beam the bent bars pass between the arms of each stirrup, the arrangement of the complete reinforcement being as illustrated in the next slide. To explain this arrangement of the bars, it is necessary to refer briefly to the nature and distribution of the stresses in a plain concrete and ferro-concrete beam. As already stated, the normal stress intensity on a vertical section of a beam varies with the distance from the neutral axis. It is well known that the bending moment and the consequent tensile and compressive stresses attain maximum value in a beam under uniformly distributed load at the middle of the span, and diminish to zero at each support, as shown in the top diagram of the next slide. If no secondary stresses existed, the lines of maximum tension and compression would be horizontal or parallel to the top and bottom of the rectangular beam. But shearing stresses due to the downward force of the load and the vertical reaction of the supports, and distributed as shown in the centre diagram, cause the lines of maximum stress to assume the curved form illustrated by the lower diagram, which is a vertical longitudinal section diagrammatically representing the effect produced by the combined action of bending moment and shearing force.

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* Abstract of a recent lecture (illustrated) given at the Northern Polytechnic Institute, London, Eng.

Providing ferro-concrete beams are designed so that the compression stress developed shall be within safe working limits, the lines of maximum compression need not be considered; but, on the other hand, the lines of maximum tension demand careful study, because the stress intensity that can safely be borne by concrete in compression is sufficient to rupture concrete in tension on lines perpendicular to the lines of maximum tension represented in the lower diagram.

Inclined Bars and Vertical Stirrups

Horizontal bars placed near the lower surface of the concrete constitute adequate reinforcement for the middle portion of the beam, but at the ends where tension occurs on diagonal planes, it is necessary to employ additional reinforcement, which takes the form of inclined bars and vertical stirrups, as shown on the next slide. It is therefore clear that the important duty of the inclined bars and vertical stirrups is to reinforce the concrete against diagonal tension rather than against vertical shear. The fact is, that the form of failure in beam tests commonly described as a shearing failure, is almost invariably a diagonal tension failure. It is the practice to make no allowance for the shearing resistance of concrete, as if the concrete in shear is subject to a stress of 50 or 60 lb. per square inch, the margin of safety against failure by diagonal tension is small. The bent-up ends of the bars lie fairly across the lines of rupture near the supports of the beam, and afford in themselves very secure anchorage. As mentioned previously, the vertical stirrups can be spaced at proper intervals along the beam to provide for variations of stress from point to point. Finally, the upper ends of each stirrup are bent over at right angles, so as to insure perfect anchorage in the concrete, and to make each stirrup a really efficient connection between the tension and compression area of the beams in which they are embedded.

It has already been said that the lines of maximum tension assume diagonal directions towards the ends of the beam. That being so, the diagonal tension can be resolved into two components, one vertical and the other horizontal, the former being taken entirely by the stirrups, and the latter by the horizontal bars. In beams continuous over one or more intermediate supports, the ends of the bent up bars are carried horizontally across the supports, and terminate near the points of contraflexure, as shown in the next slide. It is sometimes advisable to employ compression bars near the upper surface of the concrete, to assist in the compression strength of the concrete, especially in cases where unusually heavy loads have to be carried by beams.

Column Design

It is proposed to deal now with the theory of column design. As a typical ferro-concrete column is a short cylinder of concrete simply reinforced by vertical bars, it is clear that the tendency of axial loading would be to cause longitudinal shortenings accompanied by lateral expansion of the concrete and bending of the steel bars, the effects being diagrammatically represented by the broken lines of the left-hand diagram of the next slide.

Next let it be assumed that the vertical bars are braced in the middle by a set of four steel links, and then the effects of axial compression will be less marked, because the laterally-connected bars offer greater vertical resistance, and because circumferential pressure is exerted against the concrete core by the links and vertical bars. For the same reasons the lateral expansion of the concrete is reduced, as represented in the same sketch, by broken line. By applying several sets of links to the same cylinder the effects of axial loading would be still further reduced, as indicated on the right-hand diagrams.

The most remarkable use to which ferro-concrete has been applied is in the construction of piles, which can be driven through almost any kind of soil with the same facility as steel or timber piles. The next two slides illustrate the construction of ferro-concrete piles.

Durability of Ferro-Concrete

The question of the durability of ferro-concrete is, of course, most important. Every engineer and architect knows that lime concrete employed by the ancient Romans has endured to our own times, and that iron embedded in the same variety of concrete has been preserved for thousands of years without a trace of corrosion. With ordinary construction the fact has to be faced that the strength of the works must depreciate year by year, in spite of costly maintenance charges, which become more serious as time rolls on. Quite different is the position with ferro-concrete construction, the strength of which materially increases during the first few months, and goes on increasing for all time, although, of course, at a steadily-diminishing rate. Hence, for ferro-concrete the first cost is the last and only cost. The increase of strength with age is clearly shown in the diagram prepared by plotting the results of various investigators, and tests of concrete carried out in connection with the G.P.O. buildings afford a further example. Four-inch cubes were made direct from the mixer, and at two months old gave an average crushing stress of 1,800 lb. per square inch. At six months 3,500 lb. per square inch, and at eighteen months 4,200 lb. per square inch. The composition was 1 yd. Thames ballast, ½ yd. Thames sand, and 7 cwt. of cement. The strength due to the monolithic character of ferro-concrete work is clearly illustrated by the absence of result from an accident that occurred at a tramway depot, where one of the cars, running off the track, collided with and broke the supporting column dividing the shed into two spans. Although, as will be shown from the illustration, the column was completely destroyed, the roof-beam did not fail, although the span was doubled, as the rest of the work came to the support of the injured member. An example of the same nature is shown in the case of some coal-bunkers, which contained at the time of the accident 1,200 tons of coal. They are supported upon ten ferro-concrete legs, one of which was broken by the impact of a truck, and although the silos were fully loaded, no damage whatever occurred to them, the stresses being taken up by the rest of the structure.

An Interesting Test

As doubts are even now thrown by those inexperienced in this form of construction on the durability of the steel embedded in the concrete, it may be interesting to mention that, among others, Mr. J. Hannay Thompson, M.Inst.C.E., the engineer to the Dundee Harbor Trust, who has had considerable experience of ferro-concrete wharves, jetties, bridges, etc., decided to experiment with some blocks of concrete, with steel bars and rusty bars embedded in them, immersing these blocks under the sea-water for three years. On opening them the new steel rods were quite blue, and on the rusty rods the rust had entirely disappeared.

A rather remarkable case confirming the above was that of some sheet piles at Southampton. These sheet piles were moulded rather too long, and their heads were cut off and thrown on the foreshore, being covered and uncovered by the tides four times a day, as there are double tides in Southampton Water. Some few years ago these pile heads, in which the ends of the bars had been exposed to the action of the sea and air for many years, were picked up and examined by several engineers of the Great Western Railway and Mr. Lyster, of the Mersey Dock and Harbor Board, and the bars were found to be quite bright only a quarter of an inch under the broken surface of the concrete. But where they had extended beyond the concrete they were practically eaten entirely away.

With regard to watertightness, properly-proportioned concrete, a few inches thick, will be perfectly watertight, even under pressure, as will be seen from the numerous examples of reservoirs which will be presently shown upon the screen. There is no necessity for asphalt or other damp-courses where the concrete is properly made and proportioned.

The capability of good concrete to stand excessive vibration cannot be better exampled than in the case of the driving of a ferro-concrete pile. Even to-day engineers and architects express surprise at the fact that a stick of concrete up to between 70 ft. and 80 ft. in length, in extreme cases can be handled like a timber stick and driven into the ground by repeated blows from a heavy hammer without fracture or damage. I myself have witnessed 14 by 14 piles between 40 and 50 ft. in length that have received 10,000 blows. Such experience is, I think, conclusive in showing the quality of ferro-concrete to stand vibration in structures subjected to rolling loads, where a steel-riveted structure will deflect and vibrate badly. Ferro-concrete, from its monolithic nature and greater weight, is extremely stiff.

In regard to resistance to fire, good ferro-concrete is by far the most resistant material for building construction known. All forms of fire-proofed joists and stanchions have failed under actual tests, while many fires which have actually occurred in ferro-concrete structures have conclusively proved their vast superiority in this respect—to give one instance only, the fire in a warehouse at Truro, caused by the fireproof doors being inadvertently left open. The fire originated in adjoining buildings, which were entirely destroyed, while the ferro-concrete building, although in the heart of the fire, was practically undamaged.

The News in Brief—From Coast to Coast

The Northern Club, Edmonton, propose to erect a building costing $500,000.

Victoria, B.C., building permits reached the total of $7,[illegible]00,000 to November 30.

Messrs. Norton Griffiths & Company, Limited, have removed their head offices from Vancouver, B.C., to Montreal.

The St. Maurice Land Company, Limited, with head office at Montreal, has been incorporated with a capital of $500,000.

The amount spent in street paving in Brandon this year is $229,4[illegible]6.92, about 2 1/3 miles of streets having been paved with asphalt.

The Master Builders' Company, Limited, has been incorporated at Vancouver with a capital of $1,100,000, as builders and contractors.

The city of Halifax, N.S., is considering the advisability of forming a city planning commission and setting aside $4,000 to carry out the work.

Building permits issued in London, Ont., up to the end of November amounted to $1,100,000, or $70,000 more than for the whole of the year 1911.

The American Creosoted Wood Block Company, New York, are negotiating with the city authorities of Kingston, Ont., for the establishment of a branch factory there.

At the meeting of the Union of Manitoba Municipalities held recently at Winnipeg, the need for good roads was one of the leading points brought up for discussion.

Mr. O. T. Halls, Building Inspector, Regina, sends us the following building returns for that city: November, 1912, $[illegible]71,070; November, 1911, $75,000; 11 months, 1912, $5,837,[illegible]4; corresponding period of 1911, $5,018,110.

For the month of November the Montreal building permits totalled $2,550,315 as against $878,045 in the same month last year. The total for the eleven months is $18,724,015, which compares with $13,960,280 in 1911.

The Engineers' Club of Toronto, 90 King street west, will hold a weekly social night every Friday during the winter months. The arrangements are in the hands of Mr. Chas. H. Heys, Chairman of the House Committee, and Mr. R. B. Wolsey, Secretary of the Club.

The northwest corner of Main street and McDermot avenue, Winnipeg, has been bought by Mr. Herbert S. Holt, of Montreal, at a figure not far short of $600,000. While the exact price has not been given out it is understood that the price paid for the Tribune block was $171,000, and for the Main street frontage $6,000 a foot.

The Works Committee of the city of Hamilton, Ont. have instructed the city engineer to prepare plans for a new sewage disposal plant. These plans, when completed, will be submitted to an outside sanitary engineer for approval.

Some idea of the rapid growth of Vancouver may be formed from the cost of the stations which the Canadian Pacific Railway have been forced to build to handle the passenger traffic there. In 1887 the station cost $1,200; in 1897, $200,000, and next year it will amount to $1,000,000.

Contracts for laying 511,533 square yards of permanent paving at an estimated cost of $1,734,786, will be awarded by the city of Edmonton in a few days. Forty-one streets will be improved next year. This is one of the largest single contracts in the history of the paving business in Canada.

Mr. Zuest, the London manager of Messrs. Escher, Wyss & Company, seems to be pushing this firm's well-known specialties very actively. They have just put down some very large plant for South America, and Mr. Zuest has a great belief in the value of that market.

Building permits in Moose Jaw to the end of November reached a total of about $4,870,000, as against $2,431,736 for the whole of 1911. Buildings which are already proposed for 1913 approximate nearly $8,000,000. This figure includes $1,000,000 each for the new Moose Jaw Hotel Company's hotel and the Canadian Pacific Railway station.

Operations have been started on the lowering and draining of Rice Lake preparatory to cleaning it out for conversion into a reservoir for the storage of water for the city of North Vancouver. The present storage capacity of the Rice Lake reservoir is 77,000,000 gallons, but with an elevation of 680 feet the ultimate capacity will be 292,000,000 gals.

Building permits in Winnipeg for 1912 already amount to more than $20,000,000. Plans are out for several other buildings, permits for which may be issued in the course of the next few days. These will considerably swell the total and it is now apparent that the closing figure for the year will show a gain over last year of approximately $3,000,000.

Mr. Coode, of Coode, Son & Matthews, the English firm of civil engineers, is at work at Quebec studying the conditions of the harbor, with a view to a big scheme of improvements, including a dry dock. Mr. Wilson, of the same firm, last summer reported on a site at Joseph de Levis as the most suitable one for the dry dock, and the government have adopted his recommendation.

The Cedar Valley Brick Company, Limited, which has been incorporated with a capital of $150,000 at Toronto, have opened offices at 39 Adelaide street west, Toronto. This Company own in the neighborhood of eighty acres at Pine Orchard, on the Canadian Northern Railway, and expect to start building their plant about December 15th. Tenders will be asked for shortly. The company intend to produce about 100,000 bricks a day.

Members of the Montreal Builders' Exchange have petitioned the city to allow the Tramways Company to carry building material through the city streets. They claim that if the company be given permission to carry building material it will facilitate building operations, lessen the cost, help the quicker development of the city and surrounding districts, reduce the congestion of streets, and enable contractors to complete their contracts in less time than formerly.

The report of the Board of Highways Commissioners of the Province of Saskatchewan for the season of 1912 up to October 31st shows that nearly $1,000,000 has been spent this year on highways and bridges in this province. Of this amount $897,175 is for roads, and $61,000 for bridges. An effort has been made to spread information throughout the province regarding the aims and methods of the Board, and about road-making generally. This has been done in various ways, including correspondence, bulletins and specifications regarding road methods.

Several Canadian delegates were present at the annual convention of the American Society of Municipal Improvements held at Dallas, Texas. The meetings were largely attended, and the papers read were of an informative character. A sub-committee on specifications for sewer construction submitted a report giving a complete set of specifications; other reports on concrete paving specification, wood block paving, and bituminous paving were also submitted. Mr. Alcide Chausse, Superintendent of Building, Montreal, has been appointed Chairman of the Committee on Fire Protection.

According to the preliminary programme of Mr. G. Janin, chief engineer of the city of Montreal, over two million dollars will be spent on permanent paving work during next year. He has provided for an exact expenditure of $2,275,000, but besides what he has provided for in this amount, there are other works that cannot be foreseen and which will be added to the year's programme from time to time, which will bring the total up to three millions. As soon as this appropriation is approved by the council, tenders will be called for immediately, so as to have the material ordered in advance in readiness to start the work in the spring.

The owners of the King Edward Hotel, Toronto, have decided to build six storeys higher and also construct a seven or eight storey annex. Plans have been completed, and Mr. E. J. Lennox, the architect, announced the details recently. Between two and three million dollars will be spent on the extensions, $100,000 on the annex alone. The annex building, which goes up at the rear of the hotel, will contain the servants quarters and all the heating, laundry and ice making plants. These latter will be removed from the basement of the hotel, and the extra space made there used for an addition to the grill room, which will then accommodate a thousand guests. Work is not likely to start before the spring, and the adding of the extra floors and a complete redecoration of the hotel will occupy a year.

The by-law lately approved by the ratepayers of Calgary provides for the raising of $900,000 to construct a big concrete bridge over the Bow River at Centre street to replace the present structure; another concrete bridge to replace the present Louise bridge over the Bow River at Ninth street west; and a third concrete bridge to replace the present Mission bridge over the Elbow River at Fourth street west. The appropriation includes an adequate sum for removing the present iron bridge known as the Louise bridge at Ninth street west and moving it up the Bow River to Fourteenth street west. The bridge is at present only twenty-seven feet wide, and when re-erected it will be made forty feet wide, sufficient to accommodate traffic over Fourteenth street west for several years.

Berg Company's Appointment

Mr. John McGill has been appointed assistant manager by the **Berg Machinery Mfg. Co., Limited, Toronto.** For several years Mr. McGill was identified with the Collingwood Shipbuilding Company, engineers and shipbuilders. Afterwards he gained extended experience in the engine and boiler works of the John Inglis Company, Limited. He is well known throughout Canada and his appointment is therefore a particularly appropriate one. The Berg Machinery Mfg. Co. have one of the largest and best equipped plants in Canada for the manufacture of all kinds of boiler, tank, structural steel and general plate work. Having an up-to-date foundry they are in a position to quote the trade on all kinds of heavy and light castings, including cast iron columns. Their machine shops are of the latest design and they are the exclusive manufacturers of the high grade Berg brick presses and full equipment for making brick by any known process.

Mr. John McGill, of The Berg Machinery Manufacturing Company, Limited

Personal Mention

Mr. Willis Chipman will deliver an illustrated lecture on the Toronto Waterworks at the Engineers' Club of Toronto on December 12, at 8.15 p.m.

The name of the gentleman appointed to take charge of the head office at Montreal of Messrs. Escher Wyss & Company is Mr. F. H. Sendl—not Sendhl as announced in our last issue.

The St. Lawrence Bridge Company have appointed Mr. William B. Fortune general superintendent of the Quebec Bridge, Mr. W. P. Ladd, of Walkerville, Ont., being the superintendent of manufacture. The former gentleman has had a wide experience in constructing bridges in the United States. The company are building a very big plant at Rockfield, just outside Montreal, at a cost of three-quarters of a million dollars. These shops are of white pressed brick and concrete, and although primarily intended for handling work for the Quebec bridge, the directors believe that sufficient orders can be secured to keep it fully occupied when the Quebec contract is finished; hence the new shops are of a permanent character. Mr. Ladd has been in charge of the construction of these shops and the installation of the machinery, and he will also superintend, at Rockfield, the material for the Quebec bridge. About 400 men are to be employed at Rockfield. A considerable amount of English machinery has been purchased for the shops.

Unique Stone Crusher

The accompanying illustrations show a gyratory stone crusher (capacity 50 tons an hour), lately furnished by Messrs. Mussens, Limited, and the Pyke-Putnam Motor Company, both of Montreal, Que., for use on the north shore of Lake Superior by the C. P. R. The crusher, manufactured by the F. C. Austin Manufacturing Company, Chicago, together with the entire equipment, excepting the power plant, was furnished and erected at the Angus shops, Montreal, by Mussens, Limited, while the power plant, a 4-cylinder 7½ x 9 "Automatic" heavy duty gasoline engine, manufactured by the Automatic Machine Company, of Bridgeport, Conn., was furnished and installed by the Pyke-Putnam Motor Company.

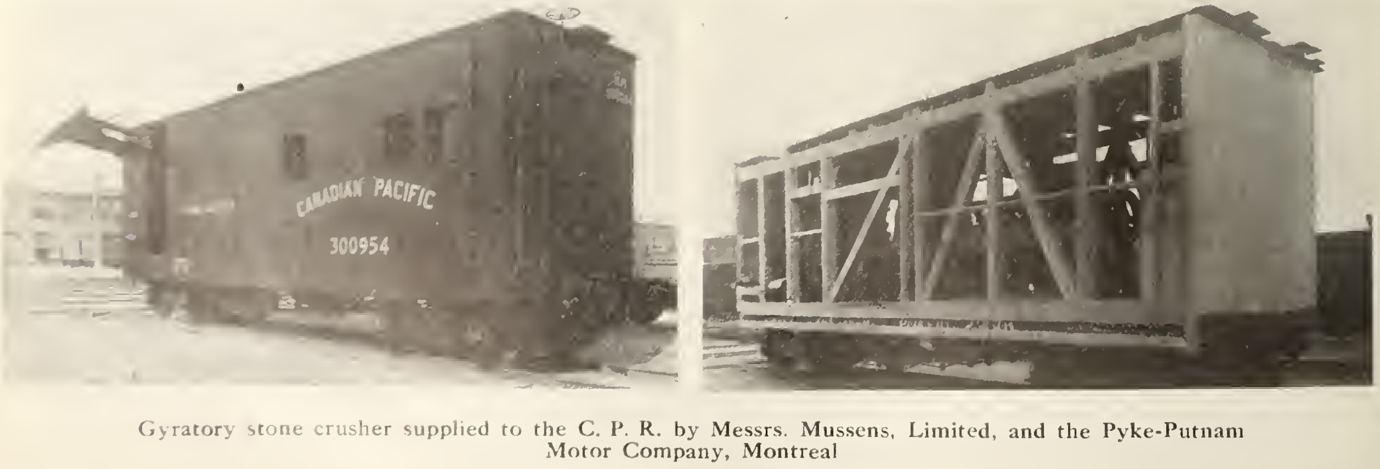
The engine is direct connected to the crusher by a semi-flexible steel coupling, sixteen inches in diameter, used for the main drive pulley. The engine is also equipped with a one-way clutch built into the extended engine base, and a throttle-governor maintains a constant speed under various loads. The matter of power equipment was left entirely in Mr. Pyke's hands, and the satisfactory results so far attained seem to warrant his selection of the "Automatic" as a reliable and exceptionally economical power plant, although Mr. Pyke would have installed a semi-Diesel type of oil burning machine had the weight not been so excessive.

The endless belt conveyor presented a most difficult problem as it was necessary that this should readily collapse and fold inside the car, as no projections could be allowed, the car being often moved from place to place. The crusher is capable of producing hourly, fifty tons of broken stones suitable for ballasting purposes.

It is interesting to note that the Canadian Pacific Railway is the first Canadian road to adopt crushed stones for ballasting purposes and it is probable that the other companies will soon follow suit, as a properly ballasted road is practically free from dust, a pleasure which few travellers have ever realized during the hot summer months, unless they have travelled very recently on some of the foremost American roads.

The Standard Underground Cable Company of Canada, Limited, Hamilton, Ont., are distributing an informative booklet descriptive of Sterling rubber insulated wire and cable. Sterling wire has withstood the test of twenty years' exacting service. It has as its foundation the best obtainable grade of copper bars. The copper conductor is first covered with a uniform protective coating of tin and then insulated to the required thickness with a carefully selected and compounded rubber. The manufacturing processes of this firm are the result of more than thirty years' successful experience in the manufacture of electric wires and cables and over twenty years' experience in making rubber covered wire. Sterling installations are claimed to be unequalled for quality and ultimate economy.

We have received from the Canadian office of Messrs. Henry Hope & Sons, Limited, a copy of the latest edition of the firm's Catalogue of Metal Windows, which illustrates various refinements upon the company's standard sections made since 1909, and in addition contains much new material. This catalogue is probably the most elaborate of its kind in existence. It is 10 in. by 13 in. in dimensions and comprises some two hundred pages of matter. The bulk of the catalogue is given over to excellent half-tone reproductions from photographs of noteworthy work into which the company's products have entered. The descriptive reading matter has been condensed in such a way that a frequent perusal of the work is a pleasure, containing as it does examples of some of the finest architectural work in the British domains and in the United States. Canadian enquiries should be addressed to Mr. A. L. Young, manager of the Canadian office of Messrs. Henry Hope & Sons, Limited, 45 King street west, Toronto.



Gyratory stone crusher supplied to the C. P. R. by Messrs. Mussens, Limited, and the Pyke-Putnam Motor Company, Montreal

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

·Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Aylmer, Ont.
Road improvements (Talbot and John streets) under contemplation of the town council. Mayor Wright has charge of matter. Work to be done next spring.

Brantford, Ont.
Waterworks (extension to cost $150,000 planned by city council. Sec. Board of Water Commissioners, Fred. W. Frank. City engineer, T. H. Jones. By-law will be voted on January 6th.

Brighton, Ont.
Gravity waterworks system to cost $50,000 planned by the council. Clerk, T. C. Lockwood. Ratepayers will vote on by-law January 6th.

Dundas, Ont.
Extension to waterworks system to cost $15,000 planned by town council Mayor, E. A. Woodhouse. Clerk, J. S Fry Chairman Water Comm., W. H Moss. 9,323 ft. 6-in. and 8-in. pipe, 20 hydrants, valves, etc., will be purchased By law passed.

Hamilton, Ont.
Motors and equipment for sewage plants planned by city council. Mayor, Geo. H. Lees. Engineer, A. F. Macallum Wentworth street works, $6,500. Ferguson ave., $3,400.

Overflow sewers. Mayor, Geo. H. Lees. City Engineer, A. F. Macallum, has completed two sets of plans, one calling for expenditure of $360,000, the other for $596,000. Nothing will be done before next May, when people will vote on by law.

Montreal, Que.
Purchase of water pipes, paving blocks and bricks to cost $139,960 under consideration of the city council. Sec., L. N. Senecal. Chief engineer, Geo. Janin.

Sewer. Plans have been prepared for construction of a trunk sewer running through the South Shore Municipalities Mayor, Wm. Webster.

St. John. N.B.
Water and sewerage system (Douglas avenue) is under contemplation of the city council Sec., H. E. Wardroper Commissioner Water and Sewerage, R. W. Wigmore.

Sarnia, Ont.
Water main contemplated by the town council. Mayor, McGibbon Report will be prepared and submitted to council on installing additional fire hydrants and laying more mains.

Toronto, Ont.
Sewers under consideration of Board of Control. Chairman, Mayor H. C. Hocken Commissioner of Works, R. C. Harris. Tenders received by chairman until December 17th for sewers on Edgewood Cres., McKay ave., Rosemount ave., lane first south of Crescent Road, Davenport Road, Lansdowne ave., Wallace ave., Ascot ave. Specifications, etc., at office of Sewer Branch, Department of Works, City Hall.

CONTRACTS AWARDED

St. John, N.B.
Watermains and sewers, Adelaide Rd., planned by city council. Sec., H. E. Wardroper. Commissioner of Water & Sewerage, R. W. Wigmore. Engineer, Wm. Murdock. Work to be done by day labor, to start at once.

Winnipeg, Man.
Water mains. Board of Control. Sec., M. Peterson. Engineer, H. N. Ruttan, 223 James avenue. Contract was awarded to J. W. Astley, Engineer of Construction, City Yards, for water mains on Magnus, Lawrence, Parr, Grosvenor and Charles streets, for cedar block pavement on lane between Main and King streets, Henry and Logan avenues.

Sewers. Board of Control. Secretary, M. Peterson. Engineer, H. N. Ruttan, 223 James avenue. J. W. Astley, Engr. of Construction, City Yards, was awarded contracts for sewers in Godfrey and Alfred avenues, and Thomas Jackson & Son, 370 Colony street, for sewer in McDermot avenue.

Railroads, Bridges and Wharves

Batiscan River, Que.
Two landing piers, Dom. Government, Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. Tenders received by secretary until December 30th. Specifications, etc., at office of F. X. T. Berlinguet, District Engineer, Three Rivers; A. R. Decary, District Engineer, Post Office, Quebec; J. L. Michaud, district Engineer, Merchants Bank Bldg., Montreal; Postmaster, Batiscan, at Department, Ottawa, and MacLean Daily Reports, Toronto, Ont.

Dorion, Ont.
C. P. Ry. Co.'s location of station here has been approved.

Finch, Ont.
Tenders received until December 21 for new school building for S. S. No. 2, Twp. of Finch, to be completed by Aug. 15, 1913. Cheque for 10 per cent must accompany each tender. Plans, etc., at office of Jas. R. Simpson, Finch, Ont., or from Neil McMillan, sec.-treas. of S. S. Section No. 2, Finch, Avonmore P. O., Ont.

Hamilton, Ont.
Harbor improvements. Tenders received by Sec. R. C. Desrochers, Ottawa, Dom. Govt., Dept. of Public Works, until Dec. 30th. Plans, etc., at offices of J. G. Sing, Confederation Life Bldg., Toronto, H. J. Lamb, Dist. Engr., Windsor, Ont., Postmaster, Hamilton, and Department, Ottawa.

Montreal, Que.
Drill hall planned for Montreal and Westmount Field Batteries Canadian Artillery. Site is being looked for. Dom. Government, Dept. of Militia & Defence. Secretary, E. F. Jarvis, Ottawa.

Newburg, Ont.
C. N. Ry. Co.'s location of station at Newburg has been approved.

Parham, Ont.
C. L. O. & W. (C.P.R.) Co. have been authorized to construct bridge No. 3401 across 3rd Depot Lake, near Parkham Twp., Winchinbrooke.

Pocahontas, Alta.
G. T. Ry. Co's location of station at Pocahontas has been approved.

Quaco, N.B.
Wharf. Dom. Govt. Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders received by secretary until Dec. 30. Specifications, etc., at offices of F. G. Goodspeed, dist. engr., St. John, N. B.; Geoffrey Stead, dist. engr., Chatham, N.B.; Postmaster, Quaco, at Dept., Ottawa, and MacLean Daily Reports, Toronto, Ont.

Saskatoon, Sask.
C. P. Ry. Co. have been authorized to construct spur for the Monarch Lumber Co. Ltd.

Bridge (12th street) planned by city council. Clerk, Andrew Leslie Two sets of plans have been prepared. One calls for concrete pier steel bridge, costing $357,000, the other for an all concrete bridge costing $313,000

Parish of St. Henri de Mascouche, Que.
C. P. Ry. Co. have been authorized to construct spur for L. A. P. & F. G. Crepeau on Lot Cadastral No. 335, Parish of St. Henri de Mascouche, County L'Assomption, Que.

St. Thomas, Ont.
Street Railway extension to cost $18,000 planned by city council. Engineer, M. H. Baker. By law to be submitted to ratepayers in January.

Twp. North Dumfries
Grand Trunk Railway Company have been authorized to reconstruct bridge No. 10 at Mileage 5.72 over public road between Cons. 7 and 8, Twp. North Dumfries.

Winnipeg, Man.
Street railway is under consideration for the Municipality of Fort Garry. Address R. A. [illegible] 91, Union Bank Bldg., Winnipeg.

Canadian Pacific Railway Company have been authorized to construct spur for the Stewart Sheaf Loader Company and also two for the Builders' Supply Company Limited.

CONTRACTS AWARDED

Hamilton, Ont.

Railway extension, cost $100,000, east end planned for the Toronto, Hamilton & Buffalo Railway. General Manager, J. W. [illegible]. Engineer, Richard L. Latham. Work is being done by company.

Montcalm, Que.

Steel bridge, 1 span, 180 x 71. Secretary, A. Lockquell. General contractors, Eastern Canada Steel & Iron Wks., Ltd., 208 Coristine Bldg., Montreal.

Sumas Jct., B.C.

Station to cost $9,000 for C. P. R. General contractor, Davies & Sanders, 615 Hastings street west, Vancouver, B. C. 2-sty., 35 x 125, frame construction. Tenders will be received by general contractor for painting, plumbing and heating.

Public Building, Churches, Schools, etc.

Aylmer, Ont.

Public building. Tenders received by Sec., R. C. Desrochers, Ottawa. Dom. Govt., Dept. of Public Works, until Dec. 30th. Plans, etc., at Post Office, London and Aylmer, and at Oepartment, Ottawa.

Brantford, Ont.

School room and church offices (Rebuilding) to cost $50,000, Pearl and West streets, for Grace Church Congregation (Anglican) c/o F. W. Bishop. Architects, Darling & Pearson, 2 Leader Lane, Toronto. Plans in progress.

Cayuga, Ont.

Armory contemplated. Dom. Govt., Dept. Militia & Defence. Sec., E. F. Jarvis, Ottawa, has asked town to grant them free site. Plans will be prepared.

Duncans, B.C.

School under consideration of the town council. Architect, W. T. Whiteway, Molsons Bank Bldg., Vancouver, B. C. 8-room brick construction, to be equipped with most modern fittings. Plans in progress.

Fredericton Jct., N.B.

Farm buildings and residence. Experimental Farm. Dom. Govt., Dept. of Agriculture. Supt., W. W. Hubbard, Fredericton Jct. Plans will be prepared.

Olds, Alta.

School to cost $50,000 under consideration. Architect, J. A. McDonald, Dom. Block, Calgary, is preparing plans.

Ottawa, Ont.

Vaudeville theatre planned, Bank St., for C. J. Booth, 252 Metcalfe street. Building to be erected on site at present occupied by old Presbyterian church.

Regina, Sask.

Fair building planned for City Commissioners. Mayor Mr. McAra. Clerk, A. W. [illegible]. Building to be used for horse show. It was decided that the building be erected on the northwest corner of the Exhibition grounds.

St. Joseph, N.B.

College to cost $75,000 for Congregation of the Holy Cross headquarters, Notre Dame, Ind., U.S.A. Architect, R. A. Frechet, 38 D'Aiguillon, Quebec, Que. Excavating and foundations done by day labor. Tenders received for other trades until Dec. 31st, by Rev. Father Superior, St. Joseph's College. 4-sty., 130 x 70, grey sand stone construction, electric generator, steel lockers, 25 x 30, lavatories.

Saskatoon, Sask.

Church to cost $4,000 planned for St. Georges Congregation to accommodate 250 people, will be built on site where present one stands. Tenders will be called at once.

Toronto, Ont.

Addition to church to cost $20,000 for Kew Beach Presbyterians. Rev. J. A. Stewart, 51 Hambly avenue. Architect, A. M. Brydon, 59 Yonge street. Brick construction, stone foundation. Plans in progress.

Parish house to cost $20,000, Markham street, for St. Peters R. C. Congregation (Rev. L. Minehan, 572 Bloor St. W.) Architect, J. A. Harvey & J. H. Haffa, 164 Bay street. 2-sty., brick and cut stone construction, brick foundation. Plans in progress.

Vancouver, B.C.

Church to cost $40,000 for the Congregation of the Greek Orthodox Church. Architect, Kennedy Bryan, North West Trust Bldg. 120 x 120, brick and sandstone construction. Sunday School and office fixtures. Tenders to be called.

Victoria, B.C.

Museum planned for The Natural History Society. Pres., W. J. Sutton, 749 Discovery street. Society has waited upon city council for grant of a free site.

Watford, Ont.

Watford Library Board have engaged W. A. Mahoney, architect, Guelph, to prepare plans for their new library. Plans will be got out at once and work started first thing in the spring.

CONTRACTS AWARDED

Brandon, Man.

Hall planned for Trades Union. General contractor, J. E. Blackwell. Reinforced concrete.

Dundas, Ont.

Barracks (alterations and additions) for The Salvation Army. Architect, Adjt. Miller, S. A. Headquarters, Toronto. General contractor, John Dickenson, Dundas. 10-sty. extension on King street citadel front, rear addition 37 x 42, white sand brick or cement block construction. Seating required. Work will start shortly.

Montreal, Que.

College for St. Denis R. C. School Commissioners, 92 Pontiac. Architect, E. P. J. Courval, 793 Henri Julien. General contractor, Jos. Ethier, 637 Delanaudiere. 4-sty., 79 x 54, cement foundation, stone, brick and structural steel construction.

Ottawa, Ont.

Church to cost $90,000 (Cooper and O'Connor) for Bank Street Presbyterian Church. Chairman, R. McGiffan, Sparks street. Architects, Hutchison, Wood & Miller, 50 Royal Exch. Bldg., Montreal. Carpenter, McDermid & Tyndall. Iron work, MacFarlane & Douglas, 250 Slater street. Plastering, Murphy & Morrow, 272 Bronson. Plumbing and heating, Holloway & Son, 373 Somerset street. Painting, Ritchie & Mann, 54 Lorne avenue.

Winnipeg, Man.

Picture theatre to cost $15,000, Sargent avenue, for Hyde Bros., 705 McIntyre Block. Architect, F. R. Hyde, 705 McIntyre Block. 2-sty., 37 x 99, concrete construction.

School to cost $540,000, Young street, for St. Stephens Church, Portage Ave. Architects and general contractors, J. McDiarmid Co., Canada Bldg. 3-sty., 36 x 96, cement foundation, brick construction.

Business Buildings and Industrial Plants

Blenheim, Ont.

Canning factory to cost $40,000 for The British Canadian Canners Ltd. Mgr., John Wall, 34 James street north, Hamilton. By-law will be submitted to ratepayers in January to grant concession to Co. and plans will be prepared.

Brandon, Man.

Murdock Bros. Company will erect large addition to present warehouse. Plans in progress.

Factory. The Emerson-Brantingham Mfg. Co., Rockford, Ill., U.S.A., will establish factory to manufacture agricultural implements.

Calgary, Alta.

Warehouse to cost $100,000 (10th Ave.) for Hudson Bay Co., Calgary. 6-sty., 75 x 130. Plans to be prepared.

Foundry to cost $50,000, Walker St., for North West Brass Foundry Co., Montreal. Plans will be prepared.

Departmental stores (addition) to cost $100,000, 1st street west, for Pryce Jones (Canada) Ltd., 12th and 1st streets. Architects, Hodgson, Bates & Beattie, Grain Exchange. Reinforced concrete. Plans in progress.

Cayuga, Ont.

Factory for manufacture of rubber goods planned by R. W. Menzie, 85 Spadina avenue, Toronto, Ont. Ratepayers to vote on exemptions Jan. 1st.

Guelph, Ont.

W. A. Mahoney, architect, has prepared plans for a new addition to the Colonial Knitting Co.'s factory. Building will be 39 ft. x 60 ft. and four storeys high. Work to be pushed forward at once.

Hamilton, Ont.

Store and apartments for G. Truman, Ottawa and Barton streets. 10 buildings, each 3-storey, brick construction. Plans will be prepared.

Restaurant contemplated (Barton St. E.) for Phil Connor, Crown Point P.O. Upper floors for banquet and dancing halls. Plans will be prepared.

Factory on Mary street is contemplated for Duncan Lithographing Co., 23 McNab street. Manager, Gordon Henderson. Architect not yet chosen.

Remodelling 10 stores, King street E., for A. Williamson, Spectator Building. Architect, H. New, Spectator Building. Three storey addition at rear, new store fronts required. Plans in progress.

Hull, Que.

Brick plant planned for a syndicate. Interested. Dr. A. T. Shillington. 281 Gilmour street; A. A. Taillon, 104 Sparks street; H. W. Chamberlain, 191 Bank street, all of Ottawa, Ont. Company has purchased 300 acres and will build plant for manufacture of bricks and pottery.

Kingsville, Ont.

Foundry and machine shop (addition) for R. F. Greene & Co. 40 x 25, brick construction, new foundry and machine shop equipment required.

London, Ont.

Warehouse contemplated on York St. for Elliott Marr & Co., wholesale grocers, King street. President, John Marr. 6-stys. Plans will be prepared.

Glove factory is planned for the Eisendrath Glove Co. Further particulars from Ald. W. D. I. Wright, 300 Hyman street.

Medicine Hat, Alta.

Paper plant to cost $150,000 for F. A. Barton and C. F. Schauto, Calgary. Factory 2-sty., 82 x 34, vat building, 48 x 14, and warehouse for storage of lime. Plant to manufacture heavy wrapping paper and straw board. Plans prepared.

Factory to cost $35,000 for J. H. Taber, Calgary 3-sty., brick construction, to be used for manufacture of chocolates, biscuits, and general confectionery. Plans in progress.

Merritt, B.C.

Office building. C. P. Ry. Co. have purchased site on corner of Belleville and Menzies streets and plans will be prepared.

Montreal, Que.

Store and residence (alteration) to cost $4,500. Owner and builder, J. A. Godin, 269 St. Denis 3-sty., 20 x 40, stone foundation, brick construction. Plans drawn.

Office building (Dominion Sq.) for Sun Life Assurance Co. of Canada, 142 Notre Dame west Architects, Darling & Pearson 2 Leader Lane, Toronto. Tenders will be called about Jan. 15th. Details of plans not yet complete.

Stables to cost $8,000, for J A Shinnick, 2652 St Laurent Architect, F. Trudel, 238 St Andre 3-sty., 78 x 32, plastic brick construction cement foundation Foundations in

Hotel planned (Dominion Sq.) Representatives, N. B. Stark & Co., Dom. Express Building Architect, Ross & McFarlane. 1 Belmont street. St George's Church has been purchased and company will be formed to build a large hotel under supervision of Hotel Belmont, New York. 10-sty concrete and steel construction, 600 rooms

Moose Jaw, Sask.

Store planned (6th avenue and Lillooet street) for J S. & J G Brown 2-sty., 75 x 80, brick construction Excavation tenders received by owner Building will be erected in the spring

New Westminster, B.C.

Store and office building, 6th street, for the British North America Securities Corporation Limited, Columbia Street Four storeys, reinforced concrete construction. Plans in progress.

Office building, 6th street and Clark street, for the British Columbia News Co., 1004 Pender street west, Vancouver. Architects, Gardiner & Mercer, Westminster Trust Bldg. Structural engineers, P. P. Brown, Pacific Bldg. Three storeys, reinforced concrete construction. Tenders will be called shortly.

Nictaux, N.S.

Fruit warehouse to cost $4,000 for the Middleton Fruit Co., Middleton. Mgr., G. N. Reagh, Middleton. Sec., F. A. Chipman, Nictaux west Concrete foundation, frame construction, metal roofing. Plans in progress.

Petrolea, Ont.

Addition to automobile factory. By-law will be submitted to grant bonus of $10,000 to the Petrolea Motor Car Co. if they build large extension to their plant. Deputy Reeve Fairbank can give full particulars.

Quebec, Que.

Steel manufacturing plant to cost $300-000 planned for Quebec Structural Co., Ltd. Prop., L. H. Gaudry & Co., Quebec. Buildings to be erected next spring. Will manufacture structural steel beams; 2-sty., 400 x 100.

Regina, Sask.

Stove manufacturing plant to cost $100,000 planned for Brand Stove Co. Vice-pres., J. P. Baumgarten, Milwaukee, Wisconsin, U.S.A. City council are considering company's application for privileges.

Flour mill and elevator to cost $500,-000 is planned for the Regina Flour Mills Co. Interested, E. D. McCallum and A. T. Hunter. Capacity, 2,000 bbls. per day; main building 6-sty., cooperage plant, power house and elevators, residences for officials.

Saskatoon, Sask.

Store and office building, cost $75,000, for the B. C. Accident & Employers Liability Insurance Company, 433 Seymour street, Vancouver, B.C. Four stys., 50 x 120, brick and mill construction. Plans in progress.

Sault Ste. Marie, Ont.

Addition to steel plant planned for Lake Superior Iron & Steel Co. Mgr., J Fraser Taylor Another blast furnace to be built, the coking plant increased and other extensions made

Sydney, N.S.

Factory to cost $20,000 is planned for Nova Scotia Shoe & Leather Co., Ltd., c/o C Gough Machinery required.

Toronto, Ont.

Store and residence to cost $4,000, Hiawatha and Gerrard streets Owner and builder, W H Guest, 599 Wilton Ave 2-sty., brick foundation, brick construction Plans drawn

R H Graham, 862 College street, has been granted a permit to erect six attached two storey brick stores and dwellings on Queen and Bertmount ave., at a cost of $6,000

A B Ormsby, Ltd., Queen and George streets, is negotiating with city to purchase site at King and Dufferin streets for the erection of a factory

Vancouver, B.C.

Office building for A Grossman & Son, Dom Trust Bldg Ten storeys, 50 xx 120, modern fireproof construction Site has been purchased on Granville St. and plans will be prepared.

Store and apartments, Park Drive, for Loo Gee Wing. Architects, Bryan & Gillam, North West Trust Bldg. 2-sty. and basement, 33 x 66, frame and brick veneer construction. Tenders to be called.

Victoria, B. C.

Warehouse and office building, cost $100,000, for the Swift Canadian Company. Reinforced concrete construction. Plans being prepared at Swift & Company's offices, Chicago, Ill. Tenders will probably be called for after first of year.

Winnipeg, Man.

Publishing plant planned for the Tribune Printing Co., 211 McDermot Ave. 75 x 120. Site has been purchased at corner of Graham and Smith streets.

Garage planned for the Canadian Fairbanks Mörse Co., Princess and Henry streets. 50 x 120, brick construction, to be erected on west side Midland street between Saskatchewan and Notre Dame avenue. Permit applied for.

Publishing plant planned for the West Canada Publishing Co. Ltd., 619 McDermot avenue. 7-sty., 50 x 120, reinforced construction. Site has been purchased at corner of St. Mary's avenue and Smith street.

CONTRACTS AWARDED

Calgary, Alta.

Store to cost $4,000, Ogden, for R. V Hunt, 420 6th avenue E. Builder and general contractor, H. Brown, 1619 3rd street N.W. 1-sty., 40 x 18, cement foundation, frame construction.

Garage to cost $10,000 for G. H. Dick, 2413 Cliffe Road. Builder, W. Steadman, 1522 13th avenue W. 2-sty., 52 x 99, cement foundation, brick construction. Excavating started.

Stores to cost $5,000 (14th St. W.) for W. Ross, 7th avenue W. Builder, H. J. Rowan, 825 14th avenue W. 2 sty., 74 x 50, brick cement foundation. Excavating started.

Stores to cost $12,000, 1st W., for Canadian Town Properties & Estates Co., Herald Block. Architect and general contractor, G. Wakefield general delivery. 1-sty., 90 x 95, brick, cement foundation Excavating started.

Guelph, Ont.

Warehouse to cost $6,500 Owner and general contractor, R Dodds, York Rd. Architects, Tanner & Colwell, Traders Bank Bldg 5 sty., cement and brick foundation

Hamilton, Ont.

Wash houses—2 buildings for washing of materials used in manufacture, each 80 x 40, steel construction; for Canada Screw Co., 134 Wellington street north Architects, Mills & Hutton, Bank of Hamilton Bldg General contractor Andrew Gow

Warehouse and factory, cost $18,000, for Robertson Bros., 12 Mary street Confectioners Manager, D Fleming Architect, D J Corrigan 231 Catharine street north. General contractor, Alex Milne, 67 Mary street Two storeys and basement, concrete foundation, brick and structural steel construction

Ice cream factory to cost $10,000, Mulberry and Railway Sts for Burke Bros

(Continued on page 67)

Tenders and For Sale Department

TOWN OF BATTLEFORD,
SASKATCHEWAN

Applications will be received by the undersigned up to **December 16th, 1912,** for the position of Resident Engineer for the Town of Battleford. Applicants must have a thorough knowledge of all kinds of Municipal work and must state age, experience, and salary expected. Duties to commence January 1st, 1913.

J. P. MARSHALL,
Secretary-Treasurer.

49-18

Intercolonial Railway

TENDER

Sealed tenders, addressed to the undersigned, and marked on the outside "Tender for Freight Car Repair Shop, Moncton," will be received up to and including **Monday, December 16, 1912,** for the construction of an addition to the Freight Car Repair Shop at Moncton, N.B.

Plans and specifications may be seen at the office of the Assistant Deputy Minister and Secretary of the Department of Railways and Canals, Ottawa, and at the office of the Engineer of Maintenance, Moncton, N.B., at which places forms of tender may be obtained.

All the conditions of the specification must be complied with.

L. K. JONES,
Assistant Deputy Minister & Secretary,
Department Railways & Canals, Ottawa, Ont.
Ottawa, Ont.
November 21st, 1912.

49-50-14

Sealed tenders, addressed to the undersigned, and endorsed "Tender for Hamilton Harbor Improvements," will be received at this office until 4 p.m. on **Monday, December 30, 1912,** for the construction of a Wharf or Retaining Wall at the City of Hamilton, County of Wentworth, Ont.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the offices of J. G. Sing, Esq., District Engineer, Confederation Life Bldg., Toronto, Ont., H. J Lamh, Esq., District Engineer, Windsor, Ont., and on application to the Postmaster at Hamilton, Ont.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 3, 1912

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 28636.

50-51-20

Sealed tenders addressed to the undersigned, and endorsed "Tender for Public Building, Aylmer, Ont.," will be received at this office until 4 p.m. on **Monday, December 30, 1912,** for the construction of a Public Building at the place mentioned.

Plans, specification and form of contract can be seen and forms of tender obtained at the Post Office, London, Ont., at the Post Office, Aylmer, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 3, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 29750.

50-51-19

Sealed tenders addressed to the undersigned, and endorsed "Tender for Machinery for 3½-Yard Dipper Dredge," will be received at this office until 4 p.m. on **Monday, December 30, 1912,** for the construction of machinery for a 3½-yard Dipper Dredge.

Plans, specifications and form of contract can be seen and forms of tender obtained at this Department and at the offices of T. H. Schwitzer, Esq., Mech. Superintendent, Birks Building, Ottawa, Ont.; A. E. Dubuc, Esq., District Engineer, Merchants' Bank Building, Montreal, Que., and J. G. Sing, Esq., District Engineer, Confederation Life Building, Toronto, Ont.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residenie of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C.DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 2, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 31360.

49-50-17

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

Tenders for Sewers

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, December 17th, 1912,** for the construction of sewers on the following streets:

Edgewood Crescent, from a point 460 feet north of Summerhill ave. to a point 140 feet further north;
McKay Avenue, from Elmwood Ave. to West End.
Rosemount Ave., from Dufferin St. to Northcliffe Boulevard;
Lane first south of Crescent Road, from Scarth Road easterly, thence northerly to north end;
Davenport Road, from Christie street to 100 feet east Marchmond Road;
Lansdowne Avenue, from Lappin ave. to Davenport Road;
Wallace Avenue and Ward Street Sewer (Earlscourt Outlet);
Wallace Avenue, St. Clarens Avenue to Ward St.
Ascot Ave., Boon Ave. to Earlscourt Avenue.

Specifications and tender forms may be obtained upon application at the office of the Sewer Branch, Department of Works, City Hall, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with or the tenders may be declared informal.

Tenderers shall submit with their tenders the names of two personal sureties approved of by the City Treasurer, or in lieu thereof, the bond of a Guarantee Company approved as aforesaid.

The lowest or any tender not necessarily accepted.

H. C. HOCKEN, Mayor,
Chairman, Board of Control.
City Hall, Toronto,
December 4th, 1912.

50-22

Board of Education

Sealed tenders, whole or separate, addressed to the Secretary-Treasurer of the Board, will be received until

Friday Noon, December 13th, 1912
for the following:

Enlargement, Malvern Ave. High School

Plumbing, Wiring

Enlargement, Western Ave. School

Plumbing, Heating and Ventilating

New School Building, Keele Street

Plumbing, Heating and Ventilating, Heat Regulating, Wiring

Specifications may be seen and all information obtained at the office of the Superintendent of Buildings, City Hall. Each tender must be accompanied with an accepted bank cheque for five per cent. of the amount of tender or its equivalent in cash. Tenders must be in the hands of the Secretary-Treasurer, at his office in the City Hall, not later than 12 o'clock noon on the day named, after which no tender will be received. The lowest or any tender will not necessarily be accepted.

W. W. HODGSON,
Chairman of Committee.

W. C. WILKINSON,
50 21 Secretary-Treasurer.

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg 11 t.f.

TENDERS

Sealed tenders will be received by the undersigned on or before **January 11th, 1913**, for the erection of a stone church in Homer, Ontario. Stone and sand supplied. Tenders may be for all or separate trades.

The lowest or any tender not necessarily accepted.

For plans, specifications, etc., apply to

NORMAN CUDNEY,
50 51 Homer, Ont.

NOTICE

Sealed tenders received by undersigned up to the 16th inst., for $1,150 five per cent., 20 equal annual payments of $213.83 for Village of Watford granolithic pavement debentures, dated 15th December, 1912, and $1,100 five per cent., 10 equal annual payments of $112.46 for public library site debentures, dated 1st December, 1912.

W. S. FULLER,
50F Village Clerk.

City Engineer Wanted

Applications will be received by the undersigned up to **December 15th, 1912**, for the position of City Engineer of the City of Peterborough. Applicants will state qualifications, experience and salary expected.

S. R. ARMSTRONG,
Nov., 19, 12 City Clerk.
48-50-5

Town of Tillsonburg

Debentures For Sale

Tenders will be received by the undersigned up to **December 16th, 1912**, for the purchase of $17,378.02 debentures of the Town of Tillsonburg. Interest at five per cent. Thirty installments.

The highest or any tender not necessarily accepted.

ALFRED E. BAYNES,
50F. Town Clerk.

Tenders for Debentures

Town of Wadena, Sask

Scaled tenders will be received by the undersigned, marked "Tenders for Debentures," up to 3 o'clock p.m., on the **20th day of December, 1912**, **for the purchase of $13,000 debentures, repayable in 40 years, 40 equal annual instalments of principal and interest combined at 6 per cent.**

This issue is for the purpose of installing an electric light and power plant in the town of Wadena.

The highest or any tender not necessarily accepted.

JAMES F. T. SAICH,
Secretary-Treasurer.
November 28, 1912. 50F.

Wanted

Locomotive crane or travelling derrick 35 to 50 foot boom. Must be in good condition. York Sand & Gravel, Limited, East Toronto, Ont. 47-50-99

For Sale

Contractor's Hoist, 8 H.P., most substantial construction. S. G. Wismer, 262 Gerrard Street East, Toronto, Ont. 50-23

Agents Wanted

Large United States manufacturer desires to appoint agencies in Canadian territories, where not already represented, for the best line of Concrete Waterproofing coatings made. Attractive proposition. Box 621, Contract Record, Toronto, Ont. 42 53 T F

Situations Vacant

Missionary Wanted

A gentleman knowing well the principal Architects and Contractors in Montreal, Quebec, etc., to represent manufacturers of porcelain plumbing fixtures of high grade, newest designs, and competitive prices, on commission and expenses basis. Substantial additional income assured. Address in first instance, Box 661, Contract Record, Toronto, Ont. 50 51 21

Business Buildings and Industrial Plants

(Continued from page 65)

Architect, J. A. Ames, Federal Life Bldg. General contractor, W. A. Smith. 2 sty., 50 x 28, reinforced concrete and structural steel construction.

Store to cost $5,000. Owner and general contractor, M. Levy, 11 Windsor street. 3-sty., pressed brick front.

Montreal, Que.

Store and dwelling to cost $8,000, Sherbrooke W. Owner and builder, Leduc & Daoust, 287 Atwater. 3-sty., 46 x 40, brick veneer construction, stone foundation.

Store and residence to cost $4,500. Owner and builder, L. A. Legault, 105 Laurier avenue. 3-sty., 25 x 60, stone foundation, stone construction. Excavation started.

Store and residence to cost $4,000. Owner and builder, Edward Gascon & Cie, 3052 St. Hubert. 3-sty., 25 x 31, stone foundation, brick veneer construction.

Store and residence to cost $5,400, Laurier. Owner and builder, M. Longtin, 1337 Lafontaine. 3-sty., 25 x 60, stone construction and foundation. Foundations in.

Ottawa, Ont.

Shops to cost $11,000, Bank street, for E. W. Borbridge, 485 Albert street, and others. Architect, J. A. Ewart, Sparks street. General contractor, I. B. Younghusband, 6 Spruce street. 60 x 55, solid brick construction.

Shops and residences to cost $11,000, Bank street. Owners and builders, Cowie & More, 302 1st avenue. 3-sty., 60 x 50, stone and cement foundation, solid brick construction. Foundations started.

Booster plant house to cost $20,000 to be erected on Slater street. Architect, F. C. Sullivan, Castle Bldg. Engineer, N. J. Ker. 3-sty. cement foundation, solid brick construction.

Shop and residence to cost $4,000. Owner and builder, John Kinduik, 988 Wellington. 21 x 40, brick veneer construction, steam foundation.

Port Robinson, Ont.

Steel manufacturing plant to cost $100 000 planned for Standard Steel Construction Co., Welland. Company is having work done by day labor; will manufacture structural steel for building bridges, etc. 1-sty., 300 x 60. Excavating started.

Quebec, Que.

Repairs to shoe factory to cost $7,850 for Gale Bros. Builder and general contractor, Magloire Cauchon, 518 Valier St. Roofing, N. Barbeau, 36 Bridge street. Brick construction.

St. Thomas, Ont.

Factory for the Noble Mfg. Co., Talbot & Moore streets. Mason, A. E. Ponsford, 605 Talbot street. Carpentry, Green Lumber Co., 1 White street. Electric lighting, plumbing and heating will be awarded later.

Toronto, Ont.

Office and warehouse to cost $7,000 for W. Lloyd Wood, 61 Gerrard E. Architect and builder, Irwin Simpson, 326 Seaton street. 3-sty. and basement, cement foundation, brick construction.

Foundry to cost $50,000 for National Iron Works, Ltd., Cherry street. General manager, Gordon F. Perry. General contractor, Jno. E. Russell, 307 Logan avenue. Roofing, H. W. Johns Manville Co., 85 Wellington street W. Wall manufacture 10-in cast iron pipes exclusively in new factory.

Winnipeg, Man.

Store and residence to cost $16,000, Sinclair street. Owner and general contractor, L. Rosenblat, 837 Alfred Ave. Architect, D. Ambrovitch, 416 Main St. 2-sty., 40 x 60, stone foundation, brick construction. Foundations in.

Office and warehouse to cost $6,000 for Brantford Roofing Co. Owena street. Architect, L. D. Barber. General contractors, J. A. Girvin Co., 317 Portage Avenue. 1-sty., 72 x 90, brick construction and foundation. Foundations in.

Residences

Hamilton, Ont.

Residence contemplated in east end. Robert F. Jarvis, Bank of Hamilton Bldg. will build fifty workingmen's residences in the spring. Frame construction.

Residence to cost $7,000, Aberdeen avenue, for W. E. Goering. Architects, Watt & Blackwell, Lister Chambers. Brick construction. Plans in progress.

Apartment house to cost $10,000 planned, East avenue S., for James Pringle. Tenders received by architects, Watt & Blackwell, Lister Chambers.

Lambeth, Ont.

Residence. Owner, J. C. Ross, c/o Jos. Pool. Cement block construction, modern fittings. Plans will be prepared at once. Work to start in spring.

Ottawa, Ont.

Residence, cost $5,500, for J. W. Nimmo, 288 1st ave. 25 x 37, brick veneer construction, stone foundation. Plans will be prepared.

2 residences to cost $5,600 for J. & M. McAllister, 158 Sunnyside avenue. 20 x 41, brick veneer construction, stone foundation. Plans in progress.

Residence to cost $7,500 for Wm. Fields, 620 Cumberland. 33 x 28, double brick veneer construction, stone foundation. Plans in progress.

Residence to cost $7,000 for Thos. Lawson Sr., Woodlawn avenue. 28 x 50, stone foundation, brick veneer construction. Plans in progress.

Residence to cost $5,500, Echo Drive, for C. E. Bleakney, 190 Metcalfe street. 17 x 41, brick veneer construction, stone foundation. Plans in progress.

Sussex, N.B.

Residence to cost $7,500 is planned for Garfield White, to be built next spring.

Toronto, Ont.

Residence, cost $6,000, two storeys, 191 Beverley street, for K. L. Sapera, 31 St. Patrick street. Architect, H. Pullan, 80 D'Arcy street. Brick foundation and construction. Plans drawn.

Residence to cost $4,000, Hurndale avenue, for David Warwick, 11 Woodycrest avenue. Architect, R. A. Abraham, 2, Jordan street. 2½-sty., brick construction and foundation. Plans drawn.

Apartments contemplated, Sherbourne and Wellesley, for W. Gragan, 57 Hewitt avenue. Plans will be prepared.

5 pair residences to cost $20,000, Essex street, for C. Coulter, 377 Palmerston Blvd. Architect, P. H. Finney, 79 Adelaide street E. Stone foundation, brick construction. Plans drawn.

Apartment house to cost $15,000, St. Clair and Avaco avenue, for Mrs. M. Cohen, 57 Heath street E. Tenders received by architects Langley & Howland, 157 Bay street. 2½-sty., brick foundation and construction.

Winnipeg, Man.

Apartments to cost $40,000 for H. Hirsch, 67 Aikins street. Architect, W. T. Davis, c/o Hooper & Hooper, 303 MacIntyre Block. 3-sty., 90 x 55, stone construction. Plans in progress.

Apartment block to cost $90,000, Wellington Crescent and Helen street, for Dr. C. W. Trick, 4 Trick Block. Plans will be prepared.

Apartment block to cost $40,000 contemplated (S. E. corner McMillan Ave. and Wentworth street) for James Brown, 327 Garry street. Plans not yet drawn.

CONTRACTS AWARDED

Calgary, Alta.

2 residences to cost $5,000. Owner and builder, L. R. Burn, Burn Block E. 2-sty., 19 x 38, cement foundation, frame construction. Excavating under way.

Residence to cost $4,000. Owner and general contractor, J. S. Stagg, 1023 12th avenue W. 2-sty., 19 x 36, frame, cement foundation. Excavating started.

2 residences to cost $8,000, Elbow Park, for F. B. Sloan, 225 25th avenue W. Builder, H. J. Sweeney, 220 25th avenue W. 2-sty., 22 ft. 6 in. x 36 ft. 6 in., frame, cement foundation. Excavation started.

2 residences to cost $6,000, Rideau Park. Owner and builder, A. A .McLatchie, 732 27th avenue W. 2-sty., 22 x 32, frame, cement foundation. Excavation done.

Hamilton, Ont.

Residence to cost $7,000, Hess St. S., for A. G. Bain, King street E. Architects, Watt & Blackwell, Lister Chambers. General contractor, R. Tope, Robinson street.

Apartment house, cost $5,000, Bay St. S., for W. A. Noble, 217 West Ave. N. Architect, Watt Blackwell, 125 Lister Chambers. General contractor, W. A. Noble, 80 George street. Three storeys, stone and brick construction.

Residence, cost $3,000, for C. E. Paterson, 52 Stanley ave. Mason, J. Sullivan, Charlton ave. west. Carpenter, Robert McNeil, 185 Hess street. 2½ storeys, brick construction. Permit granted.

Apartment house, cost $10,000. Owner and general contractor, Alex. Milne, 67 Mary street. Three storeys and basement, concrete foundation, brick construction, tar and gravel roofing. Excavating started.

Permits have been granted for the following houses: W. H. Craddock, 218 Queen street south, two storeys, brick. Bennett, 47 Highland ave., frame. W. Klinch, 54 Frederick ave., two storeys, brick. General contractor, W. Ellis, 67 Myrtle ave. Sweetlove Bros., 225 Macaulay E., cement block.

Middleton, N.S.

Residence, Connaught avenue. Owner and builder, J. F. Martin, Nixtaux Falls. 2-sty., 28 x 27, concrete foundation, frame construction. Excavation under way.

Montreal, Que.

Residence to cost $3,000, for Jno. Beauchamp, 209 Montgomery. General contractor, G. Brosseau. 2-sty., 25 x 25, cement foundation, brick veneer construction.

Residence, cost $6,000, Chabot. Owner and builder, Arsene Gauthier, 9 Plateau. Three storeys, 25 x 60, brick veneer construction, cement foundation. Foundations in.

Residence, cost $3,000, Delanaudiere. Owner and builder, Matteo Sauro, 587 Chambord. Two storeys, 25 x 40, brick, cement foundation. Excavation done.

Residence, cost $4,800, Oxford. Owners and builders, Laflamme & Bedford, 2 Prevost ave. Two storeys, 25 x 64, cement foundation, brick construction. Excavating started.

Residence, cost $4,200. Owner and builder, D. Abramovich, 2933 Drolet. 2 storeys, 25 x 47, brick, cement foundation. Foundations in.

Residence to cost $4,000 for Jos. Laporte, 1207 De St. Valier. General contractor, P. Guillotte, 1187 Boyer. 2-sty., 25 x 45, brick, cement foundation. Foundations in.

Residence to cost $3,000, Hamilton street. Owner and builder, Delphis Cote, 144 De Courcelles. Cement foundation, brick construction. Excavation started.

Residence to cost $3,100, De La Roche. Owner and builder, Honore Vermette, 2697 St. Laurent. 2-sty., 25 x 40, stone foundation, brick construction. Excavation started.

2 residences to cost $10,800, 162 St. Phillippe, for App. Archambault, 727 Bloomfield, Outremont. General contractors, J. Savage & Lecocg, 162 St. Phillippe. 3-sty., 35 x 60, stone foundation, brick construction.

Residence to cost $4,000, 54 Delinelle. Owner and builder, J. B. Prieur, 49 Iberville. 3-sty., 27 x 25, brick, stone foundation.

Residence to cost $4,200. Owner and builder. Azarie Prefontaine, 1015 Dorion. 3-sty., 25 x 40, pressed brick construction, cement foundation.

Residence to cost $4,200, Fullum. Owner and builders,Guertin & Bouchard, 408 Parthenais. 3-sty., 26 x 56, cement foundation, brick veneer construction. Excavation started.

3 residences to cost $18,000, Agnes. Owner and builder, Beaudin Freres, 15 Quesnel. 3-sty., 105 x 40, pressed brick construction, stone foundation. Plans drawn.

Residence to cost $4,800, 307 Laval avenue. Owner and builder, Menasha Lavitt, 1127 Clarke. 3-sty., 20 x 60, stone foundation, brick veneer construction. Foundations in.

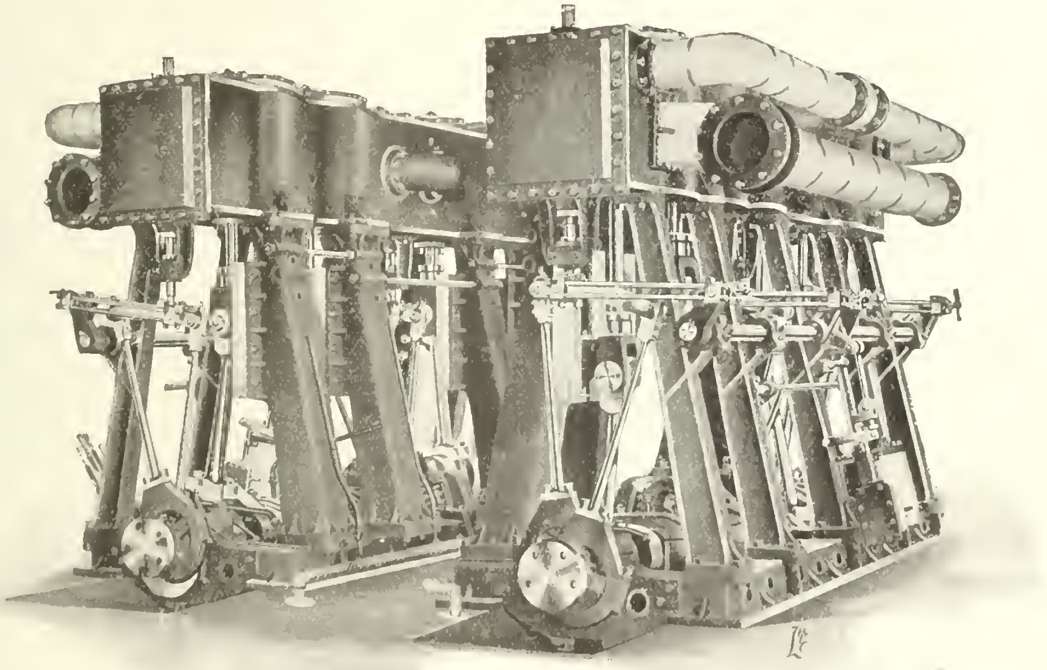
Residence to cost $6,000, Marechal. Owner and builder, M. Waxman, 540a Sanguinet street. 3-sty., 50 x 45, brick veneer construction, cement foundation. Excavation started.

Residence, cost $7,200. Owner and builder, Pietro Palagiano, 32 De Chateaubriand. Three storeys, 25 x 51, brick veneer construction, cement foundation.

Flats, cost $8,400, Cadieux, for Leiter & Smilovitch, 166 Colonial Ave. General contractor, J. B. Garceau. Three storeys, 36 x 20, Roman brick construction, cement foundation.

Residence, cost $7,200, Convent. Owner and builder, R. Laberge, 122 Ste. Marguerite. Three storeys, 36 x 40, stone foundation, brick veneer construction.

ENGINES and BOILERS



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Ottawa, Ont

Residence to cost $6,000, Marlboro. ave., for [illegible]. Architect, W. E. Noffke, Central Chambers. General contractors, Senecal Bros., c/o architect. 2½-sty., 40 x 50, brick veneer construction.

Addition to apartments to cost $7,500, Florence street, for Donald Fraser, O'Connor street. Architects, Horwood, Taylor & Horwood, 135 Sparks street. General contractor, P. J. Bellanger, 207 St. Patrick street. 21 x 24, brick veneer construction, oak and pine floors.

Residence to cost $8,500 for Geo. M. Masson, Bayswater avenue. Architect, J. A. Ewart, Sparks street. General contractor, D. Cuthbertson, 706 Echo Drive. 3-sty., 40 x 33, stone foundation, brick veneer and stucco construction.

Residence to cost $6,600 for W. H. Boyd, 16 Wortemburg. Builder, N. Hollister, 512 Bay street. 3-sty., 26 x 36, brick veneer construction, stone foundation.

Residence, cost $7,000, for C. S. Scott, 354 Laurier west. Builder, N. Hollister, 152 Bay street. Three storeys, 28 x 40, stone foundation, brick veneer constr.

Point Grey, B.C.

Residence, cost $15,000, for H. C. Chiere, Harwood street, Vancouver. Architects, Sharp & Thompson, 536 Hastings west, Vancouver. General contractors, Kellburg & Co., 603 Hastings Street W. Two storeys and basement, frame constr.

Quebec, Que.

Residence for L. St. Michel, Ste. Therese street. Builder and general contractor, A. Talbot, Marie Louise street. Roofing, plumbing and electric work, P. P. Giguire & Cie, 56 des Fosses. Ptg., Gauthier Frere, 292 St. Joseph street. 2-sty., 35 x 26, stone foundation.

St. Catharines, Ont.

Residence, cost $6,000, Berryman ave., for J. W. Etherington, 24 Berryman ave. General contractor, Howard Flack. Two storeys, 30 x 40, frame, concrete fndn.

Garage, cost $5,000, Queenston street, for Slough & Bush. Architect and general contractor, Jno. Davis, 7 Frank St. Masonry, Rymer Bros. Two storeys, brick construction, cement and hardwood floors.

Toronto, Ont.

Residence, cost $4,300, 84 N. St. Andrews Gardens, for F. Hill. Builder, W. Nash, 79 Gore Vale ave. 2½ storeys, brick construction and foundation.

Residence to cost $3,500, Indian road. Owner and builder, F. A. Ransome, 210 Westminster avenue. 2-sty., stone foundation, brick construction. Plans drawn.

[illegible] detached residences and garages to cost $11,000, Dale avenue. Owner and builder, W. H. Croft, 3 5Dundonald St. Brick and cut stone construction, brick foundation.

A. E. MacKay, 469 Bathurst street, has taken out a permit to erect two pair 2½-storey semi-detached stone and brick dwellings on [illegible] ave., cost $6,000.

L. C. Sheppard, 77 Adelaide St. E., will build eight detached two-storey and attic brick dwellings on Edgewood Cres. Cost $25,000.

Vancouver, B.C.

Residence, Eighteenth Street, for Thos. E. Neilson. Architect, M. L. Taylor, 703 Dominion Trust Bldg. General contractor, J. Alfred Thomas, 256 12th ave. E. 1½ storeys.

Winnipeg, Man.

Residence, cost $5,600, Anderson ave. Owners and general contractors, A. G. C. Realty Co., 314 Dufferin ave. Two stys., 22 x 28, frame, stone foundation. Foundations in.

Residence, cost $3,500, Tweed ave. Owner and general contractor, F. Igla, 367 Tweed ave. Two storeys, 18 x 28, frame, stone foundation. Foundations in.

Residence, cost $5,000, Westminster. Owner and general contractor, M. M. Shier, 162 Clark street. 2½ storeys, 26 x 30, frame, stone foundation. Excavating started.

Residence to cost $17,000, Dromore avenue. Architects and general contractors, Sparrow Bros, 220 Dromers avenue. 2½-sty., 38 x 49, stone foundation, brick veneer and stucco construction. Excavating under way.

Residence to cost $4,000, Burrows Ave. Owner and general contractor, J. Cohen, 689 Selkirk avenue. 2-sty., 20 x 26, frame construction, stone foundation. Excavation done.

4 residences to cost $16,000, Banning. Owner and general contractor, H. Haldorson, 48 Merchants Bank Bldg. 2-sty., 18 x 26, frame, stone foundation. Excavation started.

Power Plants, Electricity and Telephones

Kamloops, B.C.

Power station equipment. Clerk, J. J. Carment. Cons. Engr., Du Cane Duther & Co., 319 Pender street W., Vancouver. 1,000 h.p. steam, pumping and electric equipment for power station. Plans, specifications, etc., at office of Clerk, Engineer or R. S. Lea, New Birks Bldg., Montreal, Que. Tenders received by Clerk until Dec. 19, 1912.

Kincardine, Ont.

Electric lighting system (extension) contemplated by town council. Chairman of Water & Light Commission, P. Shields. Tenders will be called as soon as plans are approved.

Ottawa, Ont.

Power house to cost $30,000, Slater street, for City Council (Elec. Dept.) Plans are being prepared by Supt. at City Hall. 3-sty., concrete construction.

Miscellaneous

Cobden, Ont.

Fire protection system to cost $7,000 planned by City Council. Clerk, Jos. R. Warren. Ratepayers will vote on by-law January 6, 1913.

Kingston, Ont.

Fire fighting apparatus to cost $7,850 planned by the City Council. Clerk, W. W. Sands. By-law will be voted on January 1, 1913.

Petrolia, Ont.

Addition to fire fighting system is planned by The Lampton Packing Co. Mgr., J. E. Armstrong.

Winnipeg, Mau.

Gate valves to cost $3,632. Board of Control. Sec., M. Peterson. Engineer, H. N. Ruttan, 223 James avenue. General contractors, The Canada Foundry Co., Ltd., 146 Notre Dame E., for 16 24-in. gate valves at $2.27 each.

Business Notes

Beauceville, Que.

Warehouses of B. Fisk destroyed by fire; loss $12,000. Will rebuild.

Carp, Ont.

Store of F. E. Argue burned; loss $25,000.

Coaticook, Que.

Residence of Edouard Lafleche destroyed by fire, loss $6,000. Will rebuild.

Dryden, Ont.

Power house and sluice gates of Dryden Timber & Pulp Co. burned; loss $100,000.

Frankford, Ont.

Apple storage warehouse of David Cole destroyed by fire, loss $5,000.

New Glasgow, N.S.

Office building of W. H. McNeill Ltd. destroyed by fire. Will probably rebuild.

Toronto, Ont.

The Art Metropole, 241 Yonge street, burned. Loss to building and contents, $70,000.

New Companies

St. Maurice Sand Company, Limited, has been incorporated with a capital stock of $500,000, to deal in sand, lime and other building products, with head office at Montreal. The incorporators are J. C. H. Trudeau, C. A. Goyette, advocates, and J. A. Clavel, notary public, all of Montreal.

Newfoundland Slate Quarries, Limited, incorporated with a capital stock of $500,000, to carry on business as quarry masters, stone merchants, excavators, etc., with head office at Montreal. The incorporators are H. J. Elliott, K.C., L. A. David, advocate, and E. C. Baker, accountant, all of Montreal.

Canada Stone Company, Limited, has been incorporated with a capital stock of $1,000,000, to carry on business as builders, contractors and dealers in all kinds of building supplies, with head office at Montreal. The incorporators are W. H. Fulton, J. B. Kenny, and D. C. Sinclair, barristers, all of Halifax, N.S.

Canadian Roofing Manufacturing Company, Limited, has been incorporated with a capital of $75,000 to manufacture and deal in shingles, wall board and other building materials, with head office at Windsor. The provisional directors are L. H. Cheeseman, of Detroit, Mich.; H. W. Unsworth, accountant, and W. J. Barber, bookkeeper, of Sarnia, Ont.

Cox & Cummings, Limited, have been incorporated with a capital of $40,000 to carry on business as contractors, &c., and a general land and building company with head office at Toronto. The provisional directors are F. J. Cummings, builder; A. H. Cox, manager, and R. G. Roberts, accountant, all of Toronto.

King Street Realty Limited, has been incorporated with a capital of $500,000 to carry on business as a general land and building company with head office at Toronto. The provisional directors are Harry Riley, W. B. Sturrup, law students, J. F. MacGregor, accountant, all of Toronto.

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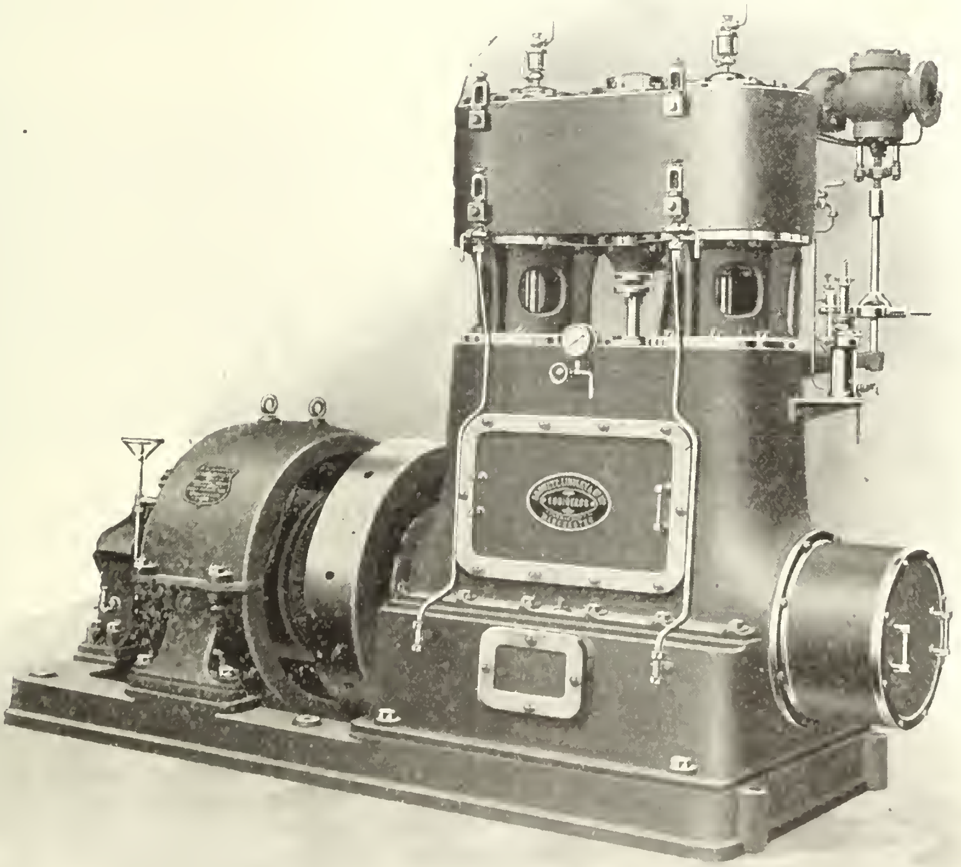

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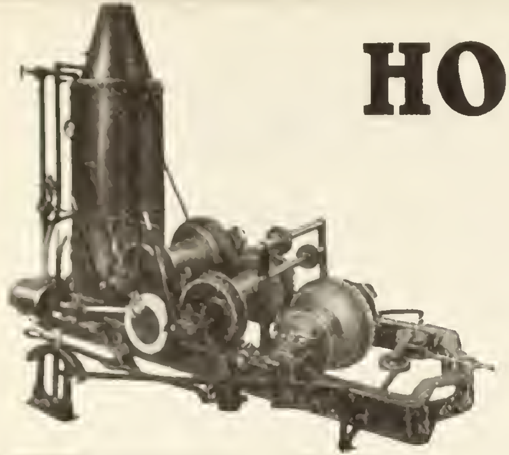

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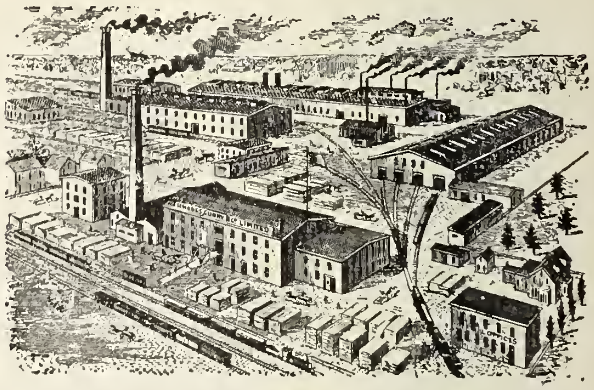

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1—Buckeye Trench Machine, cuts trench 24" & 30" x 12'
1—Parson Trench Machine, cuts trench 28" to 60" x 20'
1—Municipal Trench Machine, cuts trench 24" to 72"x24'
1—1½ yd. Owens Clam Shell Bucket
2—1½ yd. Page Drag Line Buckets
1—1 yd. Obenberger Drag Line Bucket
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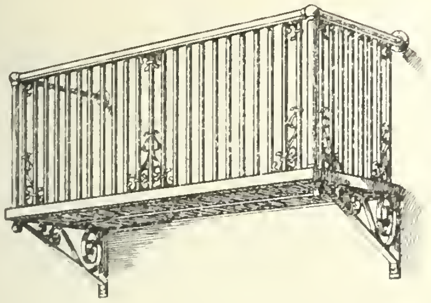

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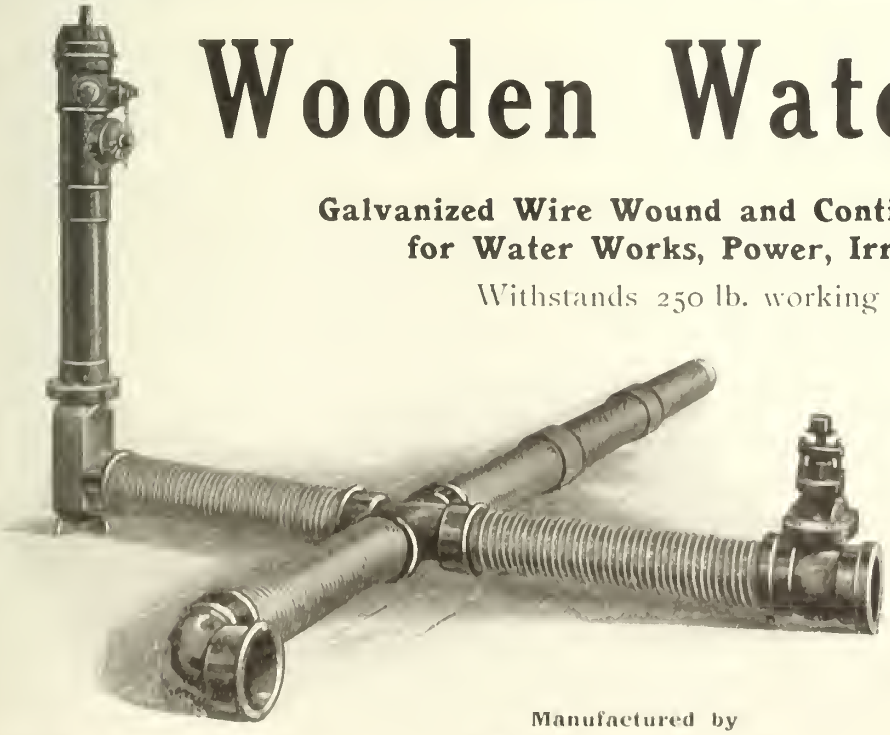

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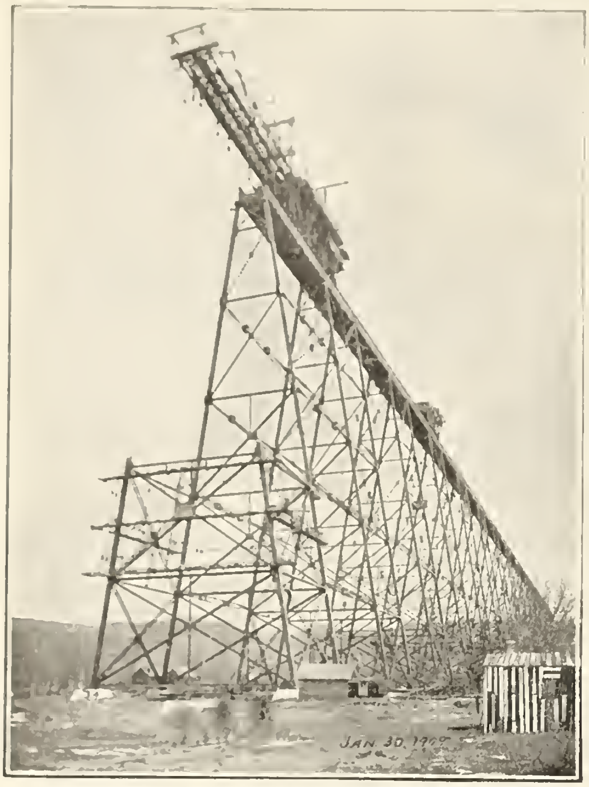

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Modern Workshop Hints, by Robert Grimshaw, M.E. Published in 1902 by Sampson Low, Marston & Company, London, Eng. 428 pages, illustrated. Price 50c.

Practical House Framing, by Albert Fair. Published in 1909 by Industrial Book Company, New York. 108 pages, illustrated. Price 50c.

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Architect, Owner and Builder Before the Law, by T. M. Clark. Published in 1905 by The MacMillan Company, New York. 387 pages. Price $1.00,

Properties of Steel Sections, by John C. Sample, C.E. Published in 1905 by McGaw Publishing Company, New York. 121 pages, illustrated. Price 50c.

Modern Plumbing, illustrated, by R. M. Starbuck. Published in 1907 by Norman W. Henley Publishing Company, New York. 329 pages, illustrated. Price $2.00.

Reinforced Concrete, by A. W. Buel. Published in 1906 by the Engineering News Publishing Company, New York. 500 pages, illustrated. Price $1.00.

Resistance of Materials, by N. de Tedasco and A. Maurel. Published in French, in 1911. 650 pages. Price $1.00.

The Sanitation of a Country House, by Dr. Harvey A. Bashore. Published in 1905 by John Wiley & Sons, New York. 98 pages, illustrated. Price 50c.

Modern Cement Sidewalk Construction, by Charles Palliser. Pub- B. T. Batsford, London. 776 pages, illustrated. Price 50c.

Modern Practical Carpentry, by George Ellis. Published in 1906 by B. T. Batsford, London. 372 pages. Price $1.50.

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Reinforced Concrete—A Manual of Practice, by Ernest McCullough, C.E. Published in 1908 by Cement Era Publishing Company. 126 pages, illustrated. Price 50c.

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The Up-to-Date Hardwood Finisher, by Fred T. Hodgson. Published in 1904 by Frederick J. Drake & Company, Chicago. 210 pages, illustrated. Price 50c.

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Engineering as a Vocation, by Ernest McCullough, C.E. Published in 1911 by David Williams Company, New York. 202 pages. Price 50 cents.

Hydraulic Cement, Its Properties, Testing and Use, by Frederick P. Spalding. Published by John Wiley & Sons, New York. 266 pages, illustrated. Price 50c.

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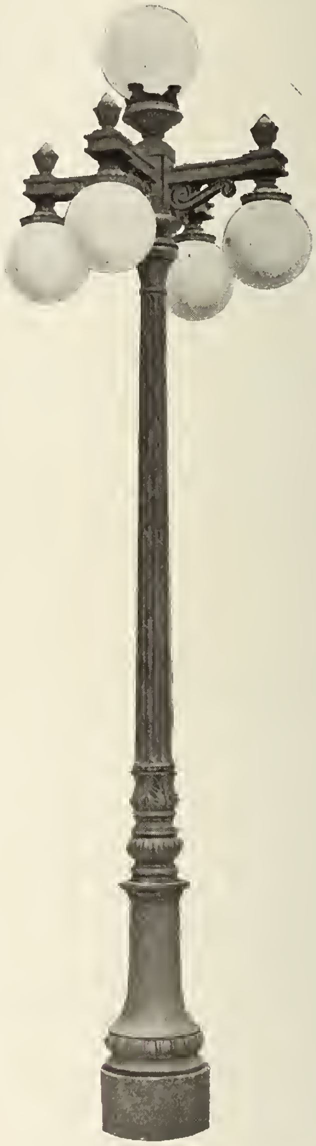

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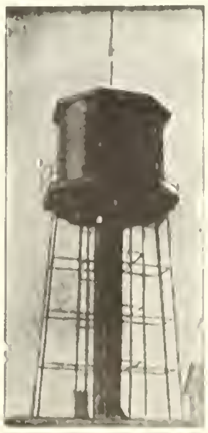

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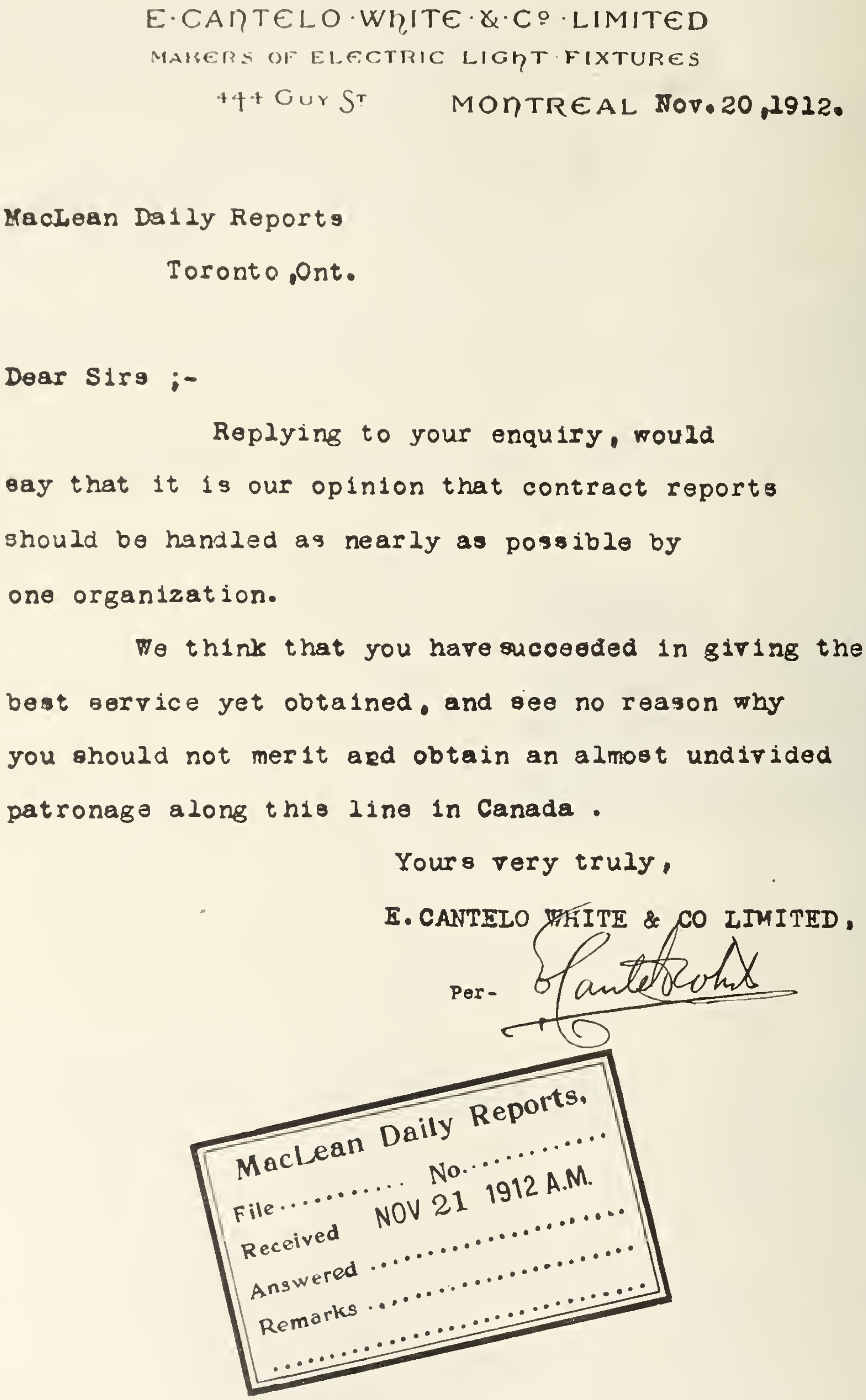

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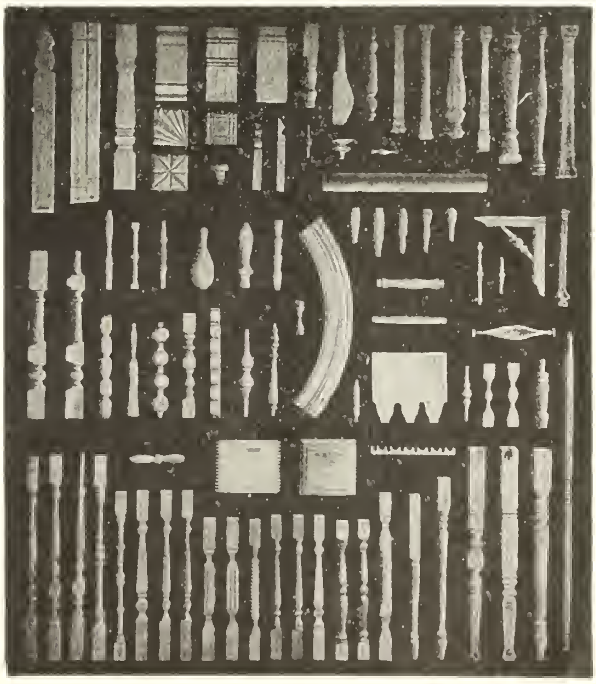

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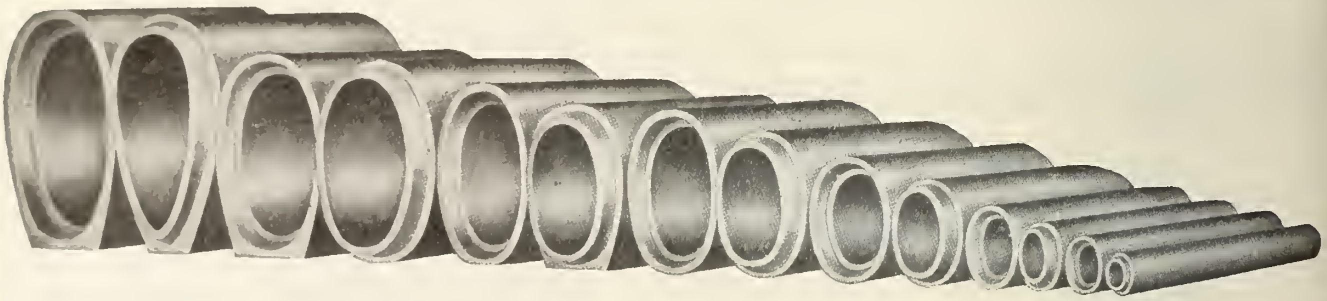

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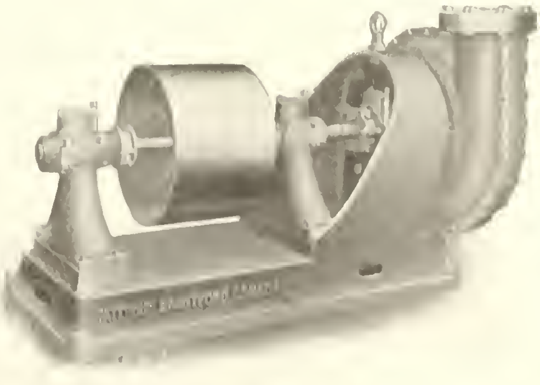

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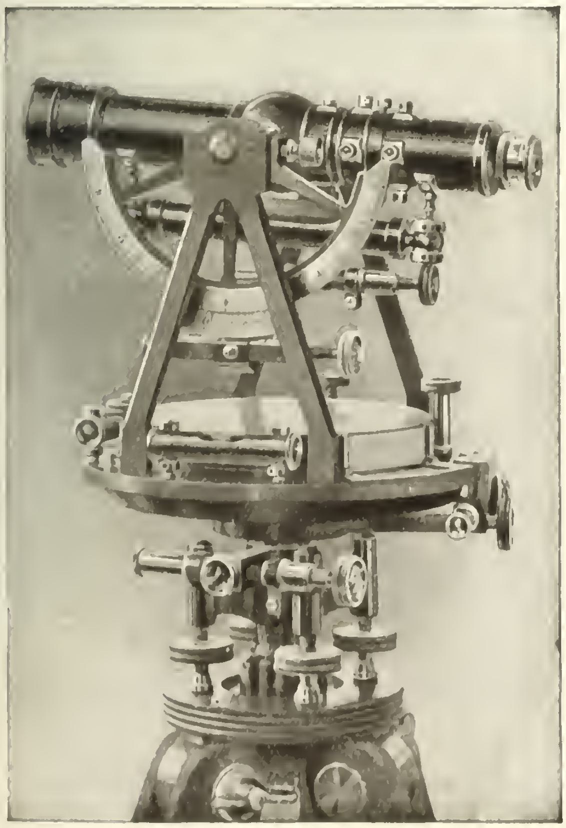

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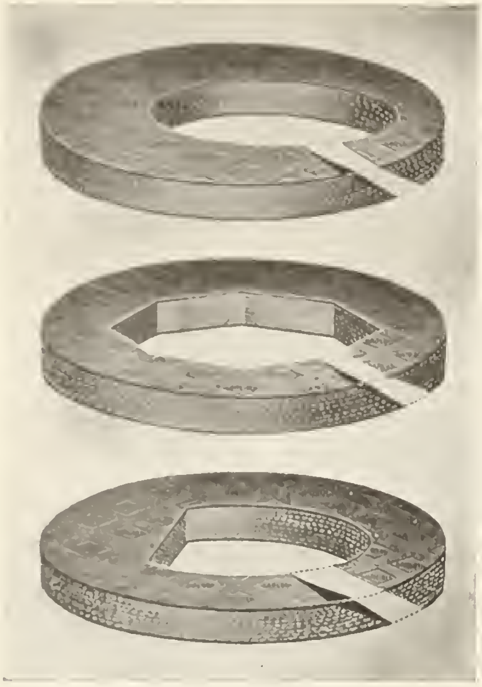

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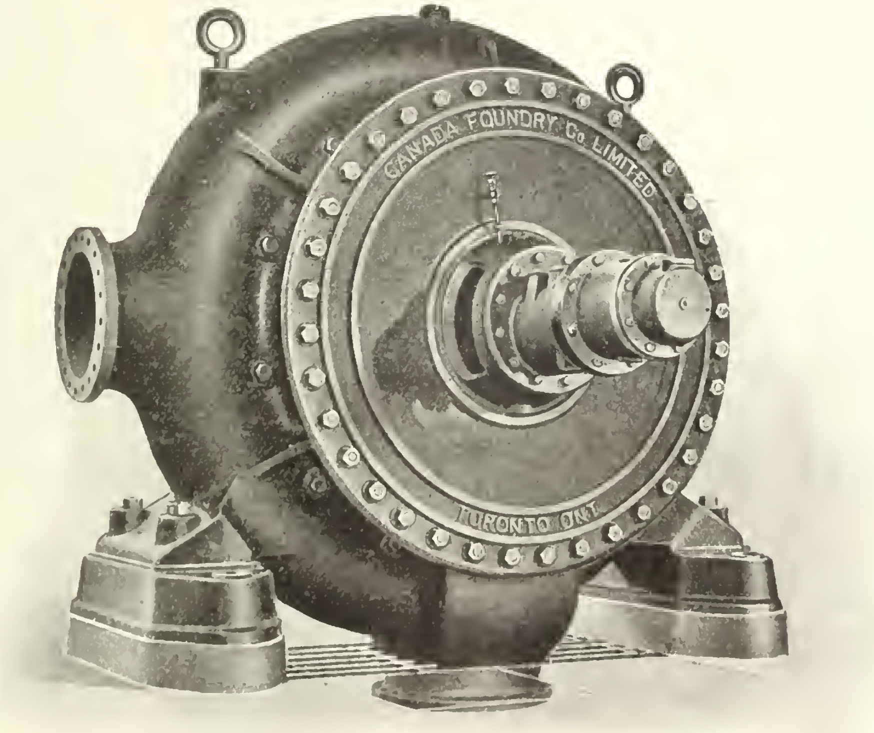

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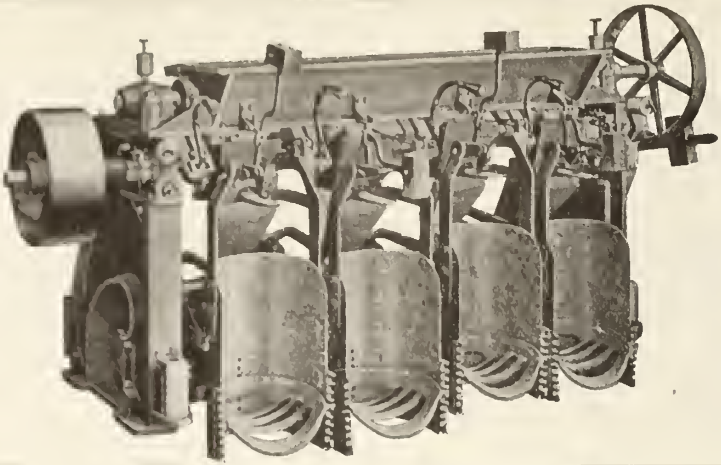

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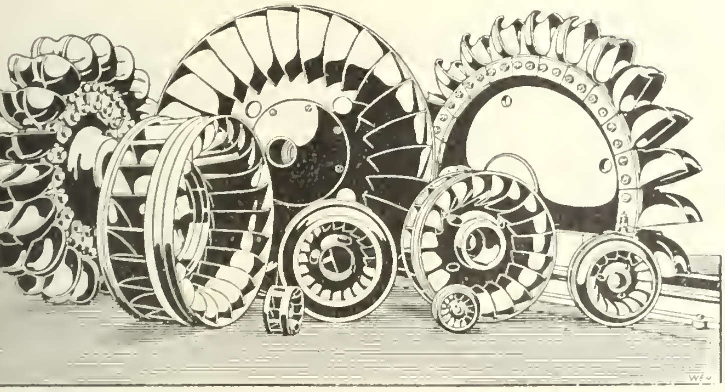

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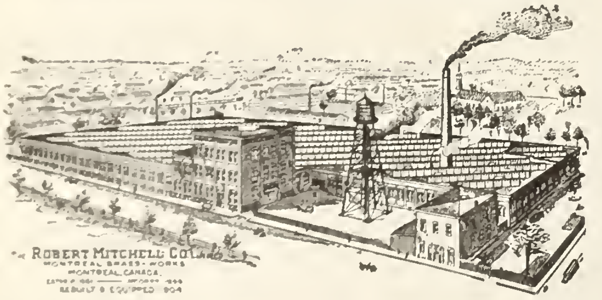
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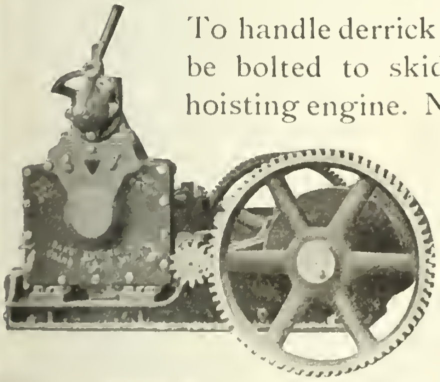

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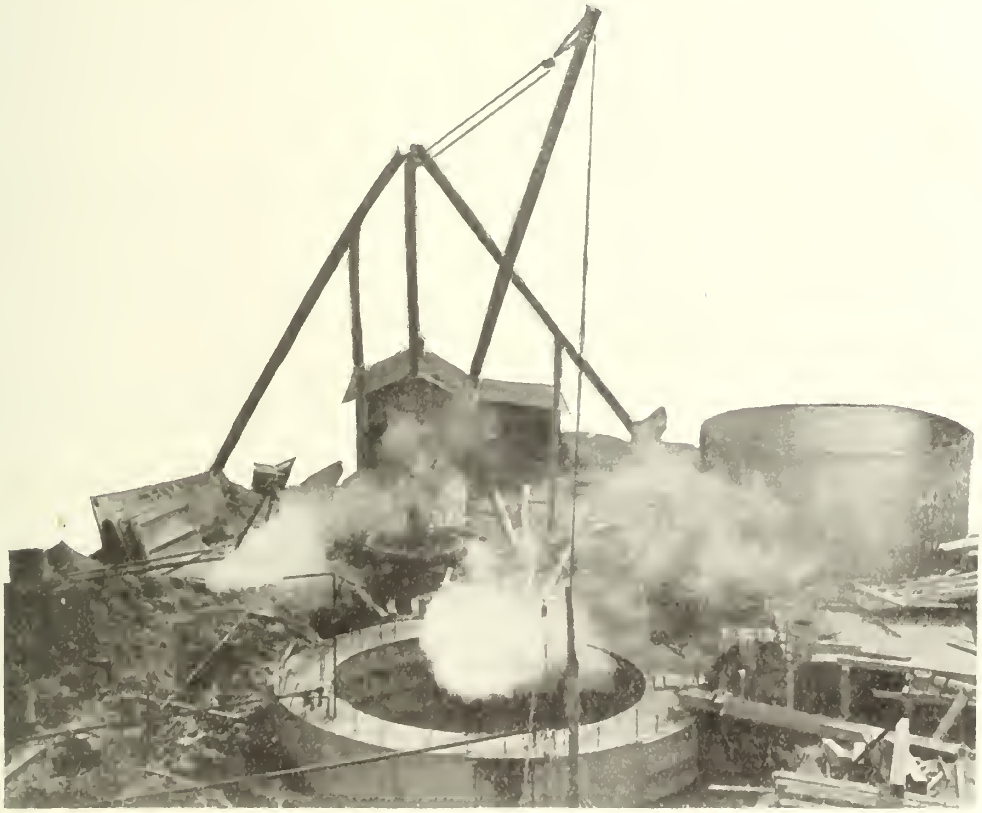

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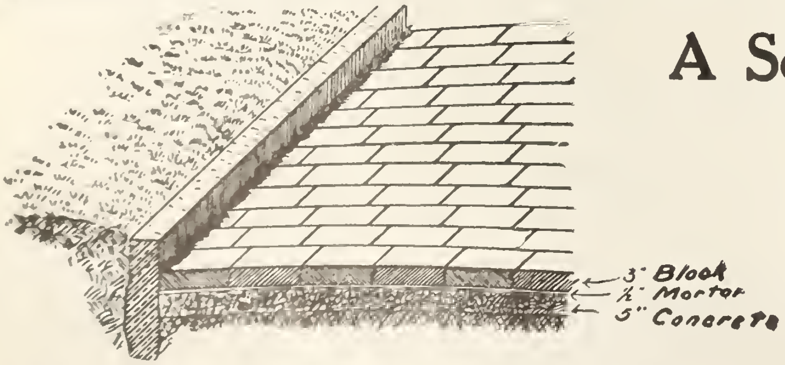

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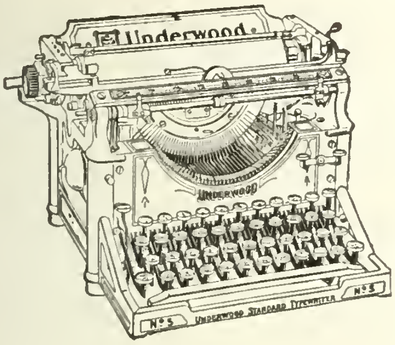

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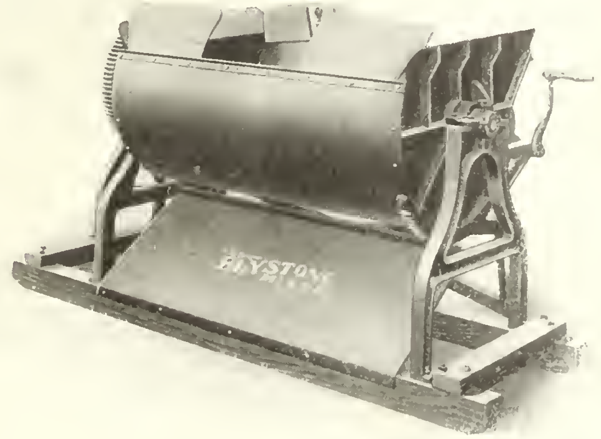

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No. 1 dry pressed red brick	$18 00
No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	11 00
Wire cut bricks for foundation work	12 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

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Hemlock Lumber—

2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00

Pine—

1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pine Bill stock	29 00	33 00
7⁄8 x 8 and 10 in. pine shelving	36 00	40 00
7⁄8 x 12 in. pine shelving	45 00	
No 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	

Pine trim for paint finish—

4 in. casing per 100 ft.	2 00
5 in. casing per 100 ft.	2 25
8 in. pine base, per 100 ft.	3 25
10 in. pine base, per 100 ft.	4 25
4 in. pine window stool	2 75

Shingles—

XXX B. C. Clear Shingles, per M.	3 60
N. B. Extras	3 50
N. B. Clears	2 90
No. 1 pine lath, per M.	4 75
No. 2 pine lath	4 25
No. 1 spruce lath	4 00

Cedar Posts—Fence—

5 in. at small end, each	25
7 in. at small end, each	35
Hemlock lath	3 25

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Following are the prices of glass at Toronto, Hamilton and London. The discounts are 15 per cent for Star and 15 per cent. for D.D.

	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.60	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24.00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:

MONTREAL

	Star	D.D
25	$3.25	$4.75
40	3.45	5.20
50	3.85	6.00
60	4.10	6.50
70	4.35	7.00
80	4.85	7.50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

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	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

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Fuller work, 65 and 5 per cent.; No. 0, 70 and 10 per cent., and 1 and 2 basin cocks, 70 per cent.
Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.
No. 4 compression bath cock .... net $1.85
No. 4½ Fuller's .... net $2.50
Square head brass cocks, 60 per cent.

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Lead pipe, $7.50 net; lead waste, $9.00 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$2.04	¼ inch	$2.86
⅜ "	2.04	⅜ "	2.86
½ "	2.72	½ "	3.57
¾ "	3.16	¾ "	4.31
1 "	4.54	1 "	6.19
1¼ "	6.19	1¼ "	8.44
1½ "	7.43	1½ "	10.13
2 "	9.90	2 "	13.50
2½ "	15.80	2½ "	21.56
3 "	20.75	3 "	28.31

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4-in.	25c ft.	15-in.	1.35 ft.
6-in.	40c ft.	18-in.	1.90 ft.
9-in.	65c ft.	20-in.	2.25 ft.
12-in.	1.00 ft.	24-in.	3.25 ft.

all less 65 per cent.

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Burnt River rubble stone delivered, $15 to $16 per toise.
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Brown coursing stone, delivered, $3.25 to $3.50 per yard.
Grey coursing stone, delivered, $2.25 to $2.50 per yard.
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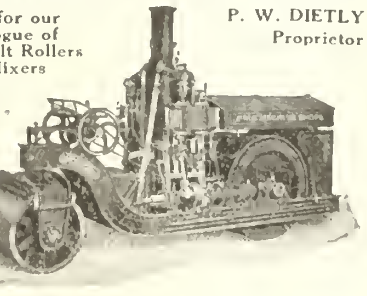

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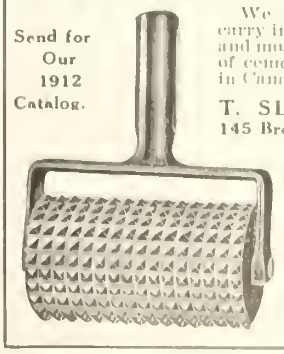

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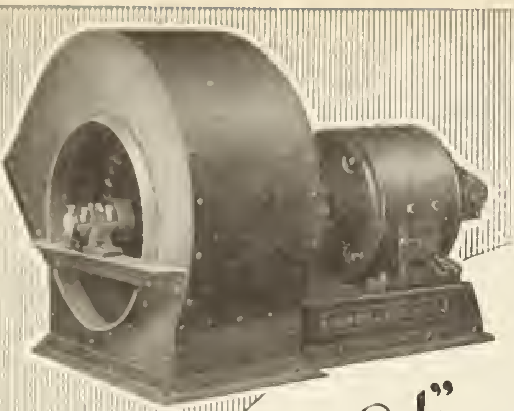

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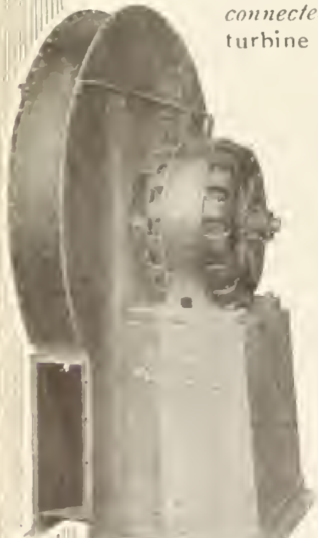

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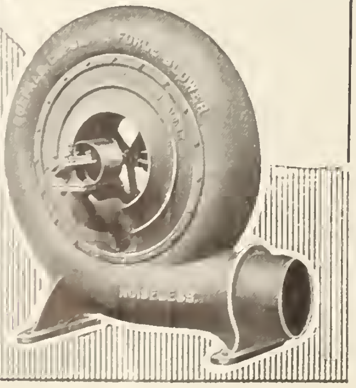

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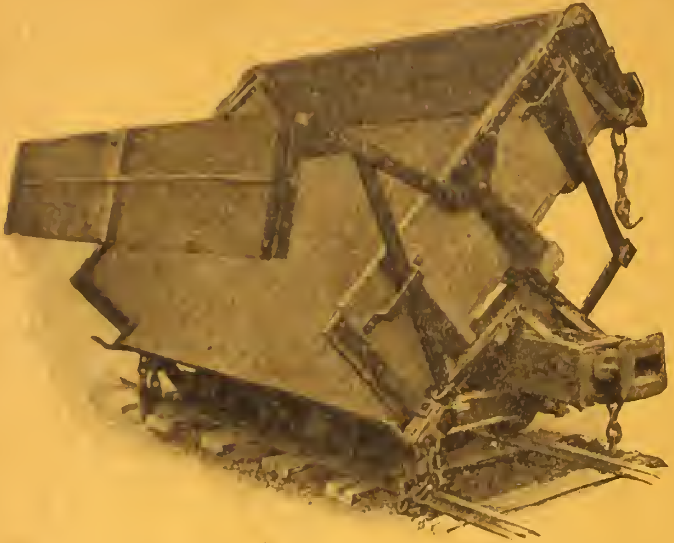

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1912.

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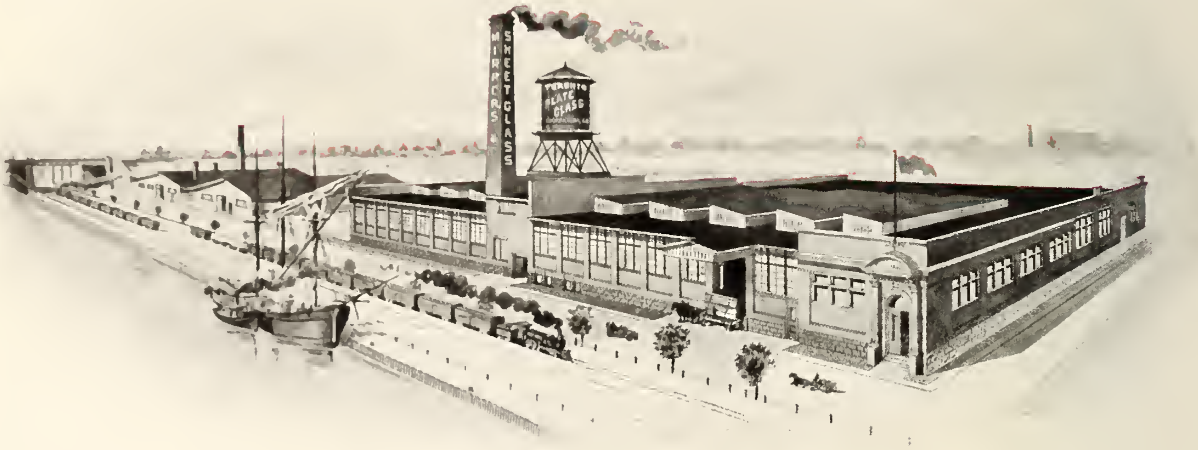

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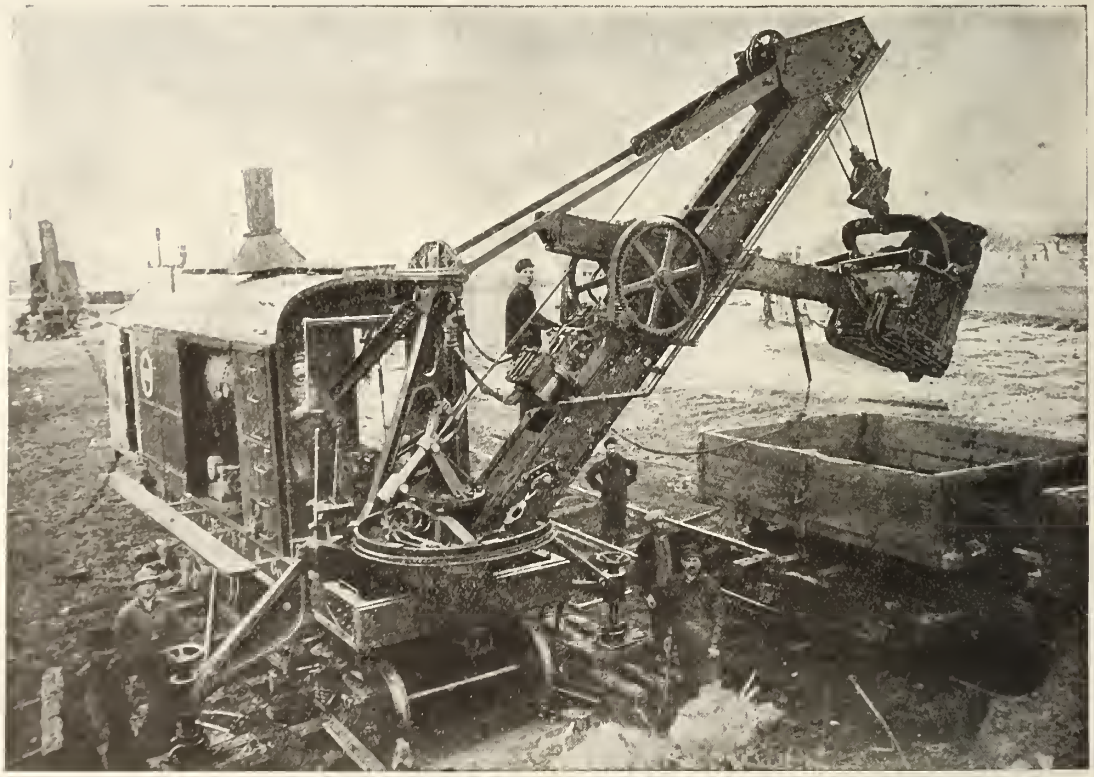

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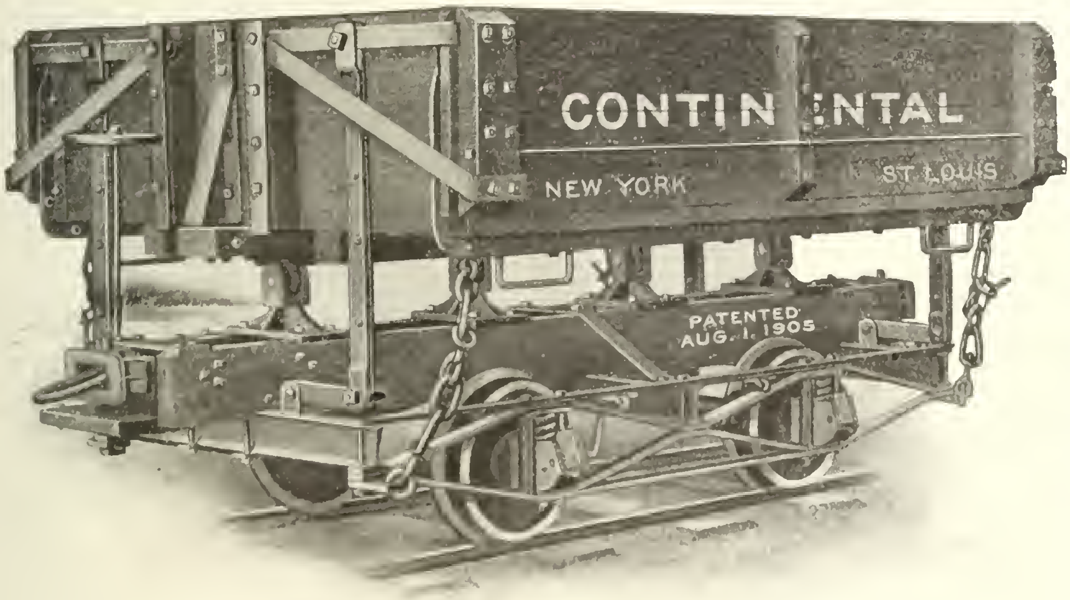

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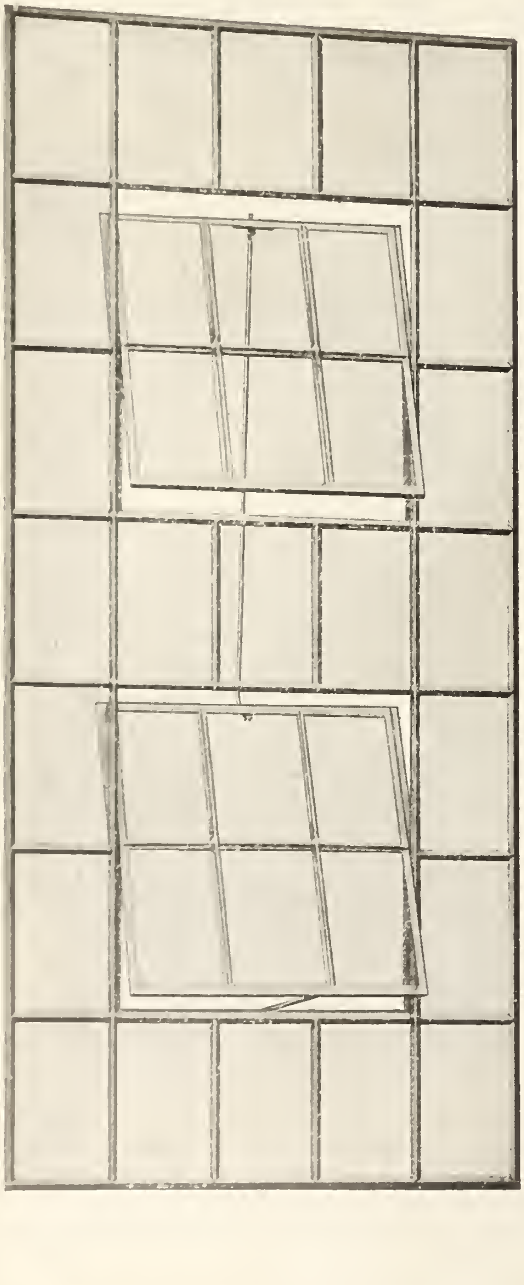

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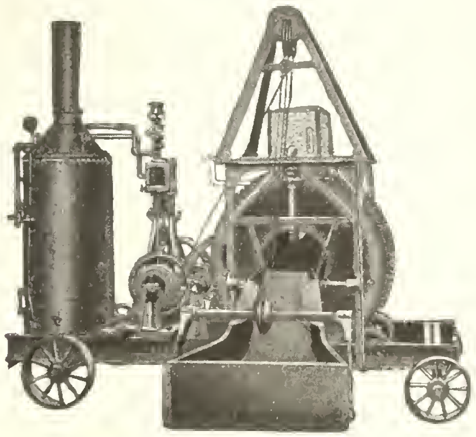

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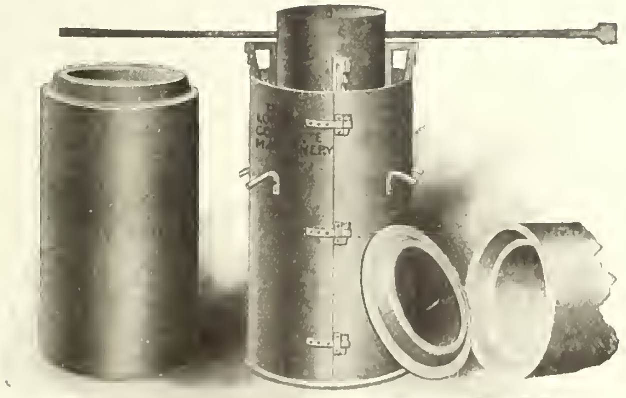

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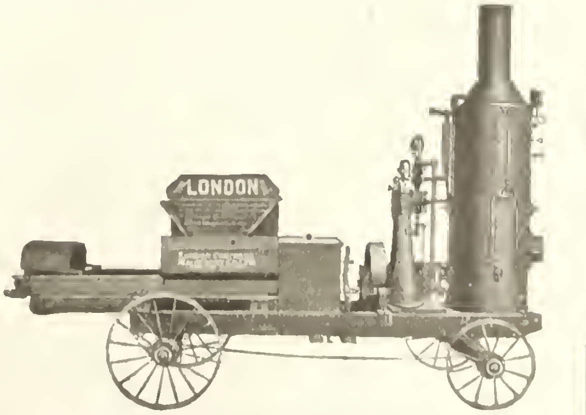

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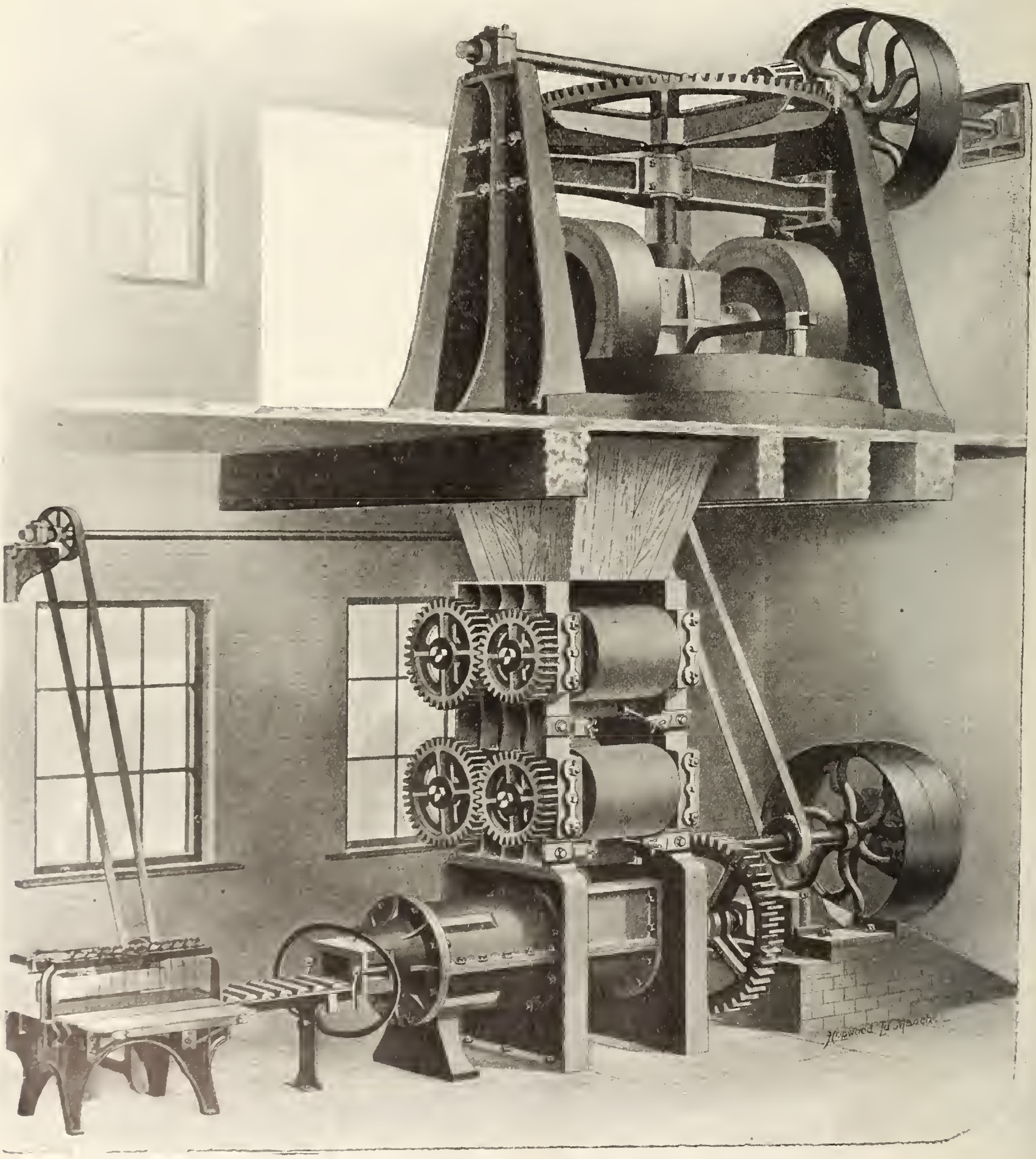

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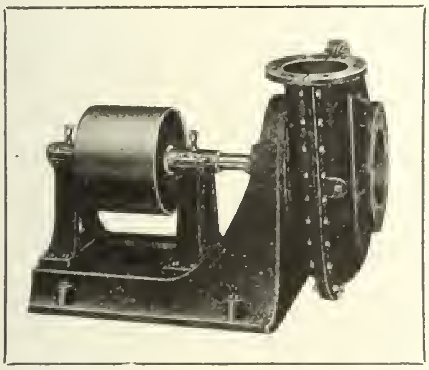

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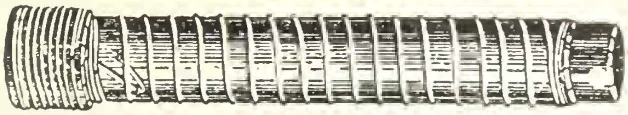

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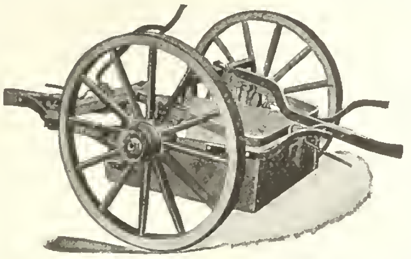

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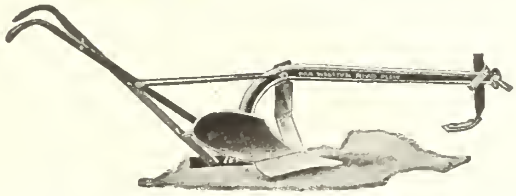

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The "Covert Improved" Throat and Damper

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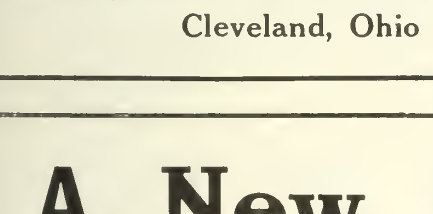
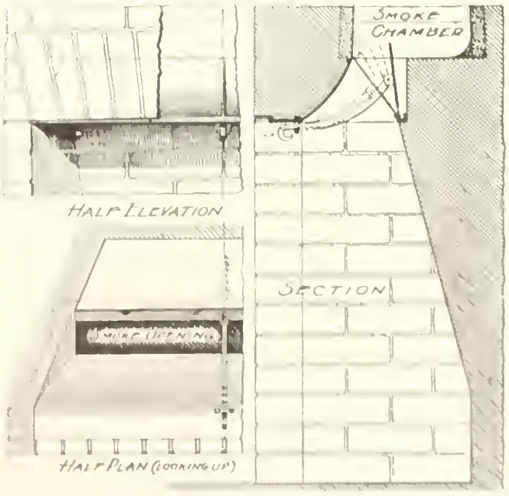


Front View of Damper

Extensively used throughout the United States by foremost architects and builders



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A Mile of Barrett Specification Roofs

The wonderful Bush Terminal in Brooklyn, New York, illustrated below, includes 181 buildings, comprising tremendous warehouses, enormous pier sheds for docking ocean steamers, huge factory buildings, a large modern power house and an enormous freight structure.

These buildings stretch for a mile along New York harbor. Their total roof area is 3,100,000 square feet—more than seventy acres.

This entire area was covered with Barrett Specification type of roofs, for the following reasons:—

1. Low first cost.
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3. They are not injured by steam, gases and acid fumes.
4. They are fire retardent and take the base rate of insurance.
5. The net unit cost, that is, the cost per foot per year of service, is lower than that of any other type.

Although some of the buildings are fifteen years old, the roofing contractor states that the expense for maintenance of this entire roof has been less than $10.00. He estimates that if metal or ready roofings had been used, it would have been impossible to keep the buildings free from leaks and that the painting bill alone up to date would probably have amounted to at least $50,000.00.

We wrote to the Bush Terminal Company, asking what they thought about Barrett Specification Roofs. The Vice-President replied:

> "We use this kind of roofing because our experience has shown it to be the best and cheapest. Our analysis of first cost of application and cost of maintenance entitles us to speak with some measure of authority."

We shall be pleased to mail architects, engineers or owners of buildings copy of the Barrett Specifications with diagrams from which blue prints can be made. Address our nearest office.

SPECIAL NOTE

We advise incorporating in plans the full wording of The Barrett Specification, in order to avoid any misunderstanding.

If any abbreviated form is desired, however, the following is suggested.

ROOFING — Shall be a Barrett Specification Roof laid as directed in printed Specification, revised August 15, 1911, using the materials specified, and subject to the inspection requirements.

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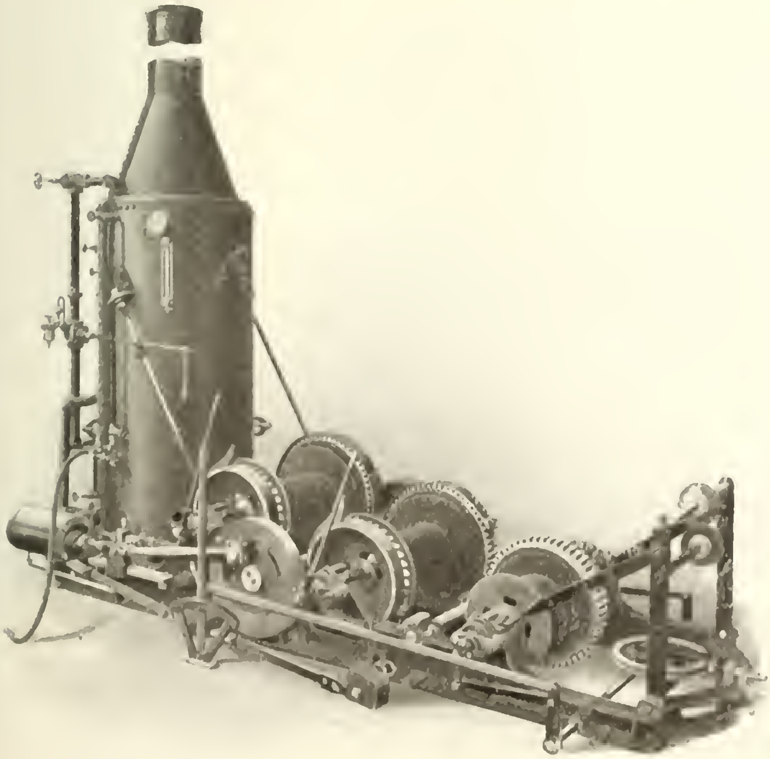

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The Asphalt & Supply Co., Limited

Sole Canadian Agents for The Mexican Eagle Oil Company, Limited
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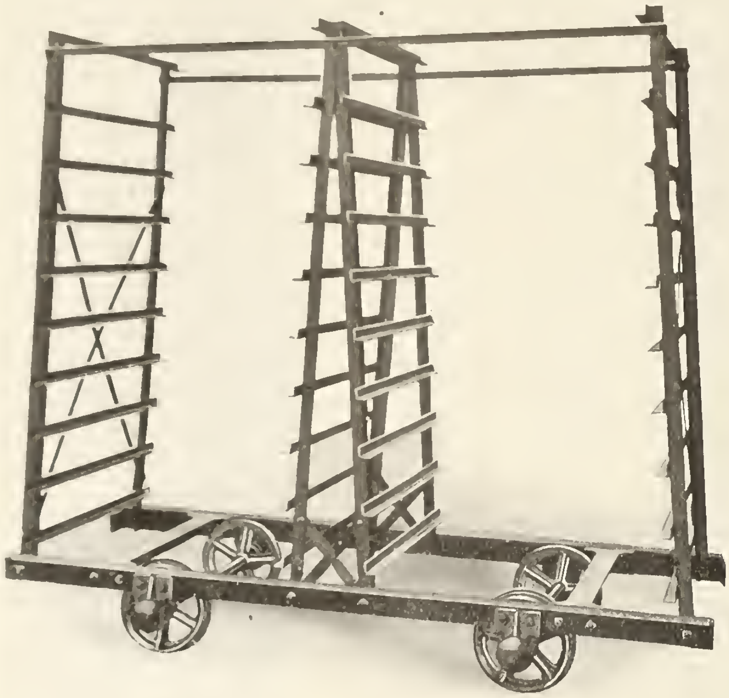

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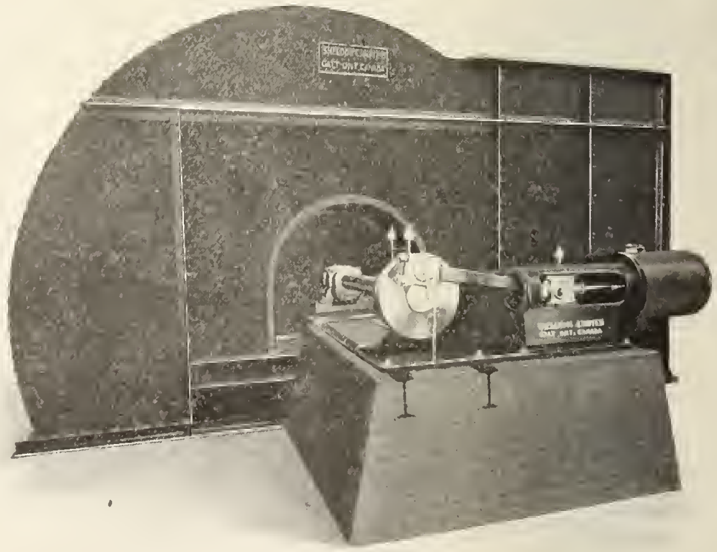
Now is the time to be considering the system you intend installing, and we will be pleased to point out the merits of ours.

Full particulars supplied on application, and our Engineering Department is at your service.



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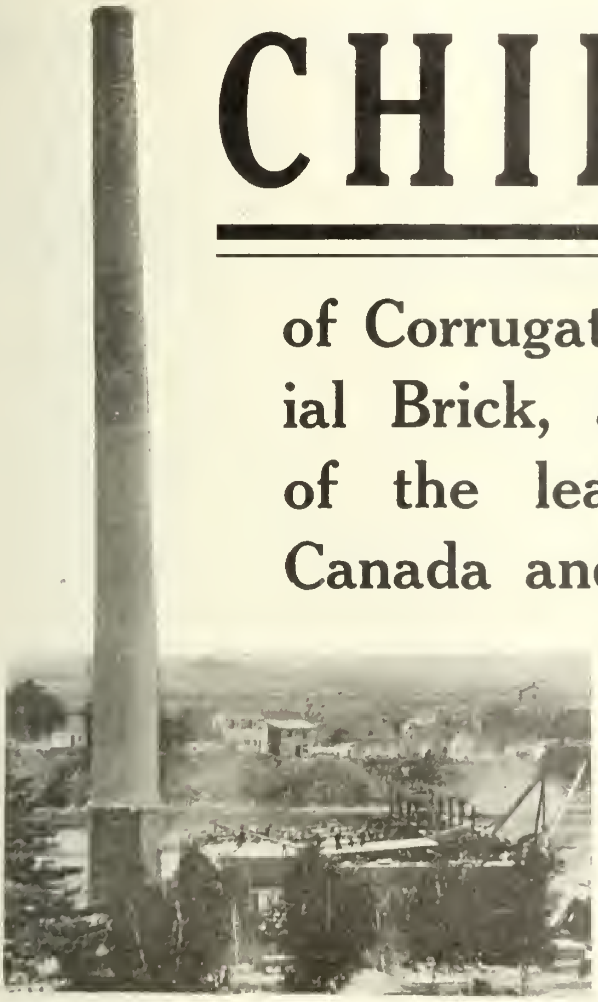
CHIMNEYS

of Corrugated Perforated Radial Brick, as used by many of the leading industries of Canada and the United States.



The illustration shows one of the many chimneys that we have erected in Canada—it was built for the Wayagamack Pulp & Paper Company of Three Rivers, Que. The chimney is 250 feet in height with an inside top diameter of 10 feet.

Some of the advantages of Corrugated Perforated Radial Brick for Chimney construction are: The corrugated sides of the bricks give the maximum adhesion to the mortar. The bricks are perforated vertically thus forming dead air cells. This dead air prevents the rapid heating or cooling of the walls and also the condensation of gases, maintaining always the maximum draught regardless of the weather.

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The shale from which **BESSEMER BLOCK** are made is naturally adapted to the manufacture of paving brick. It vitrifies under heat into a hard, tough, stony body. It contains the proper content of flux to make a **tough** paver, not an excess of flux making a brittle, glassy paver, nor a deficit of flux making a soft, punky paver.

SHALE BANK WITH STEAM SHOVEL AT WORK

Starting with a **wonderful** supply of **shale** naturally adapted to the manufacture of vitrified paving brick, we have built modern factories, and are using up-to-date methods to produce a paving brick that is uniformly tough, hard and fit for paving.

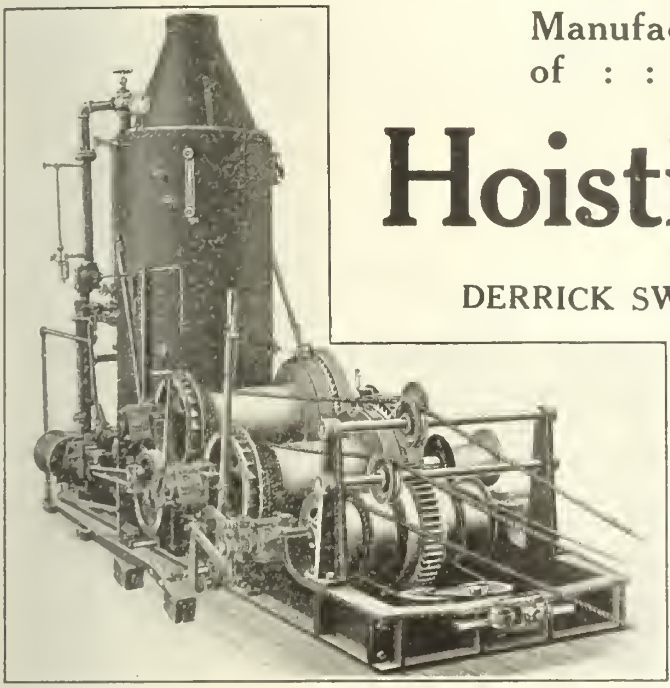
BESSEMER BLOCK ARE TOUGH

Toughness is the essential quality of a first class paving brick

Bessemer Limestone Co.

YOUNGSTOWN, OHIO

The Doty Marine Engine and Boiler Co., Ltd.



Manufacturers of : : : : : **Superior**

Hoisting Engines

DERRICK SWINGERS, MATERIAL ELEVATORS
SAFETY MINE CAGES, ETC.

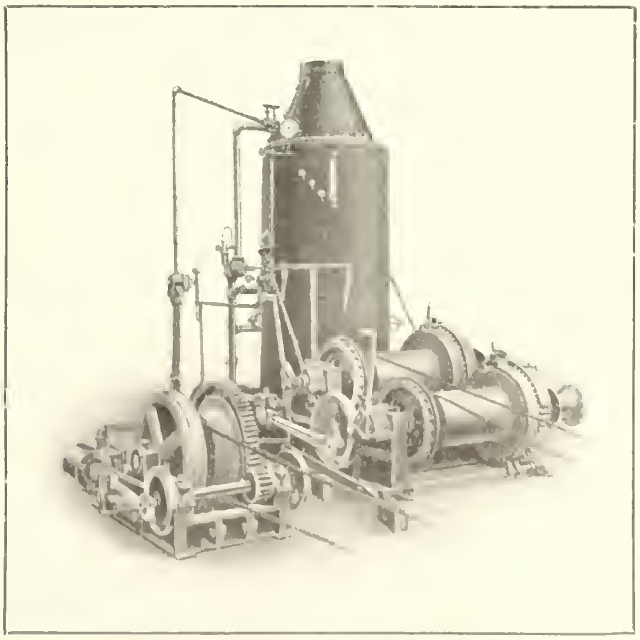
for Contractors, Miners and Quarrymen

This cut is a true and correct representation of our Hoisting Engines with Improved Swinger attached. Its general appearance will manifest the superiority of our designs which appeal to every buyer and user of our Hoisting Engines. Note the trolley in front permitting the double sheave tighteners to travel back and forth as the swinging ropes wind up and unwind from the pony drums alternately, thereby obviating the ropes crossing over each other on the drums, also the rigid stands with extra large shafts carrying two bronze bushed sheaves leading the hoisting ropes over the swinging drums. Our ratchets are cast separately from the drum flanges and the pawls drop out automatically when released and remain out until engaged by the operator. The crank pins are extra large and the connecting rods of steel, cross heads of the hanging type working on steel guide bars and improved throttle valve comprise the leading external features of our improved Hoisting Engines.

We also make independent Steam Derrick Swingers; these have gear ratio of 27 to 1, are powerful and easily controlled by a special reversing throttle, and adjustable brake serves as an intermediate friction which prevents snapping of the Derrick lines when reversing.

This half-tone illustrates the manner in which our Derrick Swinging Engines are usually arranged in relation to the hoisting engine. The advantages of an independent swinger are, "Increased power of the main hoisting engine, increased swinging power, easier to operate and control,' while the division of weight into two machines facilitates change of position more readily and permits the engine being placed closer to the derrick where limited for space.

Special provisions are now being made to supply the ever increasing demand for our Hoisting Engines and several carloads will be shipped to Winnipeg this month to supply our Western trade. Early deliveries can also be secured direct from our works.



The Doty Marine Engine and Boiler Co., Limited

GODERICH, CANADA

To buy our Engines is a Guarantee of satisfaction

Wire Rope for Hoisting and Hauling

Wire Screens and Perforated Plates for Brick Making

Works and Head Office, Hamilton, Ontario

Steel Wire Reinforcing for Cement

Steel Wire Lathing

Manufactured by

The B. Greening Wire Co.

Limited

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STRENGTH
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PLASTIC QUALITIES
PLASTER PRODUCTS

Above is our new trade mark. In future it will appear on all bags and other packages of the following plaster products :

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Pulpstone, Woodfibre Wall Plaster
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Prepared Finishing Plasters
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Proven Quality

Hardwall Plasters

If you are a builder, supply dealer or a contractor who has not handled or used our brands you are missing a great opportunity, write us at once for particulars.

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Room 38, 82 King St. East, Toronto
Makers of Anchor Brand Sanded Hardwall Plaster

Remarkable Record for 1912

150 Important contracts this year

ROMAN

Partial List

PUBLIC BUILDINGS

Name	Location	Architect
Graphic Arts Building	Richmond and Shephard Sts., Toronto	F. S. Baker
Forest Lawn Mausoleum	York Mills, Ont.	Green & Wicks
Power House for Ont. Developement Co.	Niagara Falls, Ont.	E. J. Lennox
Central Y. M. C. A.	College Street, Toronto	Burke, Horwood & Whi
Carnegie Library	Owen Sound, Ont.	Forster & Clark
West Town Hall	Montreal, Que.	Peden & McLaren
Children's Home	Weston Sanitarium	Denison & Stephenson
Y. M. C. A.	Galt, Ont.	Shattuck & Hussey
Paving for Mutual Life Insurance Co.	Waterloo, Ont.	Darling & Pearson
Masonic Temple	Ottawa, Ont.	J. A. Ewart
Fire Hall	Ottawa, Ont.	F. C. Sullivan
Addn. to Sick Children's Hospital	Elizabeth Street, Toronto	Stevens & Lee
Anti-Tuberculosis Hospital	Ottawa, Ont.	A. LeB. Weeks

CHURCHES

Name	Location	Architect
ST. ALBAN'S CATHEDRAL	Albany Avenue, Toronto	Cram, Goodhue & Fergu and Symons & Rae
ST. PAUL'S (Anglican)	Bloor Street East, Toronto	E. J. Lennox
McVICAR MEMORIAL CHURCH	Montreal, Que.	McVicar & Heriott
ST. GILES PRES. CHURCH	Hamilton, Ont.	Stewart & Witton
DUFFERIN ST. PRES. CHURCH	Toronto, Ont.	J. W. D. Greig

BANKS

Name	Location	Architect
Union Bank	Queen Street West, Toronto	Darling & Pearson
Molsons Bank	Lucknow, Ont.	Walter Stewart & Son
Molsons Bank	Drummondville, Que.	P. J. Turner
Union Bank	Gerrard Street and Greenwood Avenue	H. B. Gilbert
Bank of Ottawa	Pembroke, Ont.	Morris & Moore

STORES, FACTORIES AND GARAGES

Name	Location	Architect
Murray-Kay Warehouse	Ontario Street, Toronto	Page & Warrington
Imperial Tobacco Company	Granby, Que.	Imperial Tobacco Co.
Fremes Warehouse	Adelaide and Peter Streets, Toronto	Langley & Howland
The Young Company's Warehouse	Sudbury, Ont.	J. Francis Brown
Independent Cloak Company	Richmond Street West, Toronto	I. Feldman
Stores for Miller & Rosenthal	Lachine, Que.	W. P. Aquin
Standard Silver Company	Madison Avenue, Toronto	Owners
Wolseley Motor Company, Garage	Avenue Road, Toronto	E. J. Lennox
E. M. F. Garage	Alexander Street, Toronto	H. J. Smith
C. S. Boone, Garage	Huntley Street, Toronto	Chadwick & Beckett

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Sales Agents for Quebec

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WORKS AT

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Enlarged Plant
Increased Business

nportant Contracts

SCHOOLS

Name	Location	Architect
High School	Weston, Ont.	Munro & Mead
High School	North Bay, Ont.	T. R. Burt
Central School	Burlington, Ont.	Munro & Mead
Academy	Thurso, Que.	C. St. Jean
School for Boys	Blue Bonnets, Que.	J. D. Viau
Public School	Echo, Ont.	Geo. W. Hall
Public School	Etobicoke, Ont.	P. White Lindsay
Dominion Park School	Lachine, Que.	J. D. Viau
Frontenac School	Hochelaga, Que.	J. Dalbe
Public School	Welland, Ont.	C. M. Borter
Public School	North Bay, Ont.	H. W. Angus

APARTMENT HOUSES

Name	Location	Architect
Parkdale Mansions	Queen St. and Beatty Ave., Toronto	S. A. Waggett
The Strathcona	Queen Street West, Toronto	Owner
The Baldwin	Baldwin Street, Toronto	A. E. Yolles
The Algonquin	Tyndall Avenue, Toronto	W. B. Charlton
Athelma Apartments	Grosvenor St. and Surrey Place, Toronto	Mallory & Thatcher
College Heights Apartments	St. Clair Ave. and Oriole Rd., Toronto	Edwards & Saunders
Audley Court	Kendall Avenue, Toronto	J. Hunt Stanford
Beaufort Apartments	Davenport Rd. and Dupont St., Toronto	Ellis & Connery
Tara Hall	Sault Ste. Marie, Ont.	C. P. Meredith
Kingsley Mansions	King St. and Jamieson Ave., Toronto	Redmond & Beggs
The Roslyn	Glen Rd. and Howard Ave., Toronto	J. A. Harvey

RESIDENCES

Name	Location	Architect
Sir H. M. Pellatt	Wells Hill, Toronto	E. J. Lennox
Wm. Caldwell	Forest Hill and Heath St., Toronto	F. S. Baker
W. Kahnert	Spadina Avenue, Toronto	S. H. P. Watson
Studio Fairmount Court	Mile End, Que.	Jos. Perrault
F. G. Russell	Russell Hill Road, Toronto	F. S. Baker
Entrance Gates	St. Hillier, Que.	Peden & McLaren
Major Murray	Whitney Avenue, Toronto	Page & Warrington
S. H. Ewing	Westmount, Que.	G. W. White
P. White Lindsay	Weston, Ont.	P. White Lindsay
P. E. Layton	Westmount, Que.	J. Ogilvy Harris
Thomas Rea	Mount Clair Avenue, Toronto	C. P. Band
J. B. Tudhope	Orillia, Ont.	E. Webb & Son
Entrance Gates and Lodge for Sir H. M. Pellatt	King, Ont.	P. White Lindsay
J. Coulter	Balmoral Avenue, Toronto	E. G. Wilson
E. R. McNeill	Ottawa, Ont.	A. LeB. Weeks

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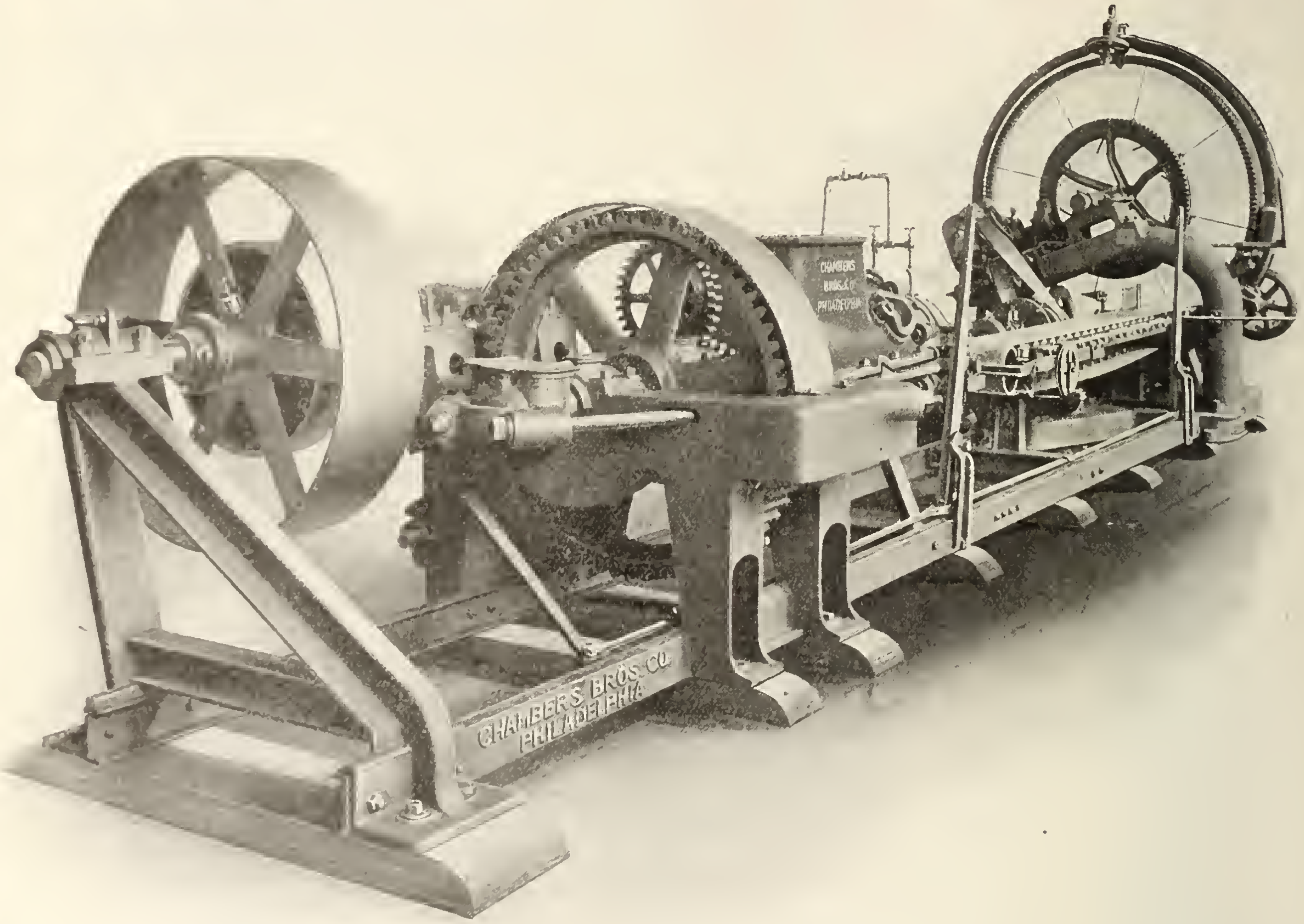
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The No. 10 Auger Brick Machine with No. 5 Automatic Side Cutter
Cuts Building Brick, Hollow Brick and various thicknesses and lengths of Furnace Block material.

Auger Brick Machines of Various Capacities with Rotary End-Cut and Side-Cut Tables

Special Machines for Street Paving Block

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Special designs submitted for mosaics and faience work

The Lautz Company
145 Church St., Toronto, Ont.

BRIDGEBURG TORONTO BUFFALO

300,000,000 Wire-Cut-Lug Blocks

No 3074. Buffalo-Glenwood Road. 21 miles long. New York State Highway. Constructed June, 1911. Photo June 8, 1912, at Station No. 369. 13 miles from Buffalo City Line

WATCH THIS LIST OF LICENSEES GROW

During the year 1910	Corry Brick and Tile Co.	Corry, Pa.
	United Brick Company	Conneaut, Ohio
During the year 1911	Kushequa Brick Company	Kushequa, Pa.
	Sterling Brick Company	Olean, N.Y.
	Reynoldsville Brick & Tile Company	Reynoldsville, Pa.
	Danville Brick Company	Danville, Ill.
	Paterson Clay Products Company	Clearfield, Pa.
During 1912	Wabash Clay Company	Veedersburg, Ind.
	Clinton Paving Brick Company	Clinton, Ind.
	Alton Brick Company	Alton, Ill.
	Deckman-Duty Brick Company	Cleveland, Ohio
	Tuna Valley Pressed Brick Company	Bradford, Pa.
	Foster Paving Block Company	Bradford, Pa.
	Metropolitan Paving Brick Company	Canton, Ohio
	Bessemer Limestone Company	Youngstown, Ohio
	Murphysboro Paving Brick Co.	Murphysboro, Ill.
	Binghamton Paving Brick Co.	Binghamton, N.Y.
	Peebles Paving Brick Co.	Portsmouth, Ohio

The combined output of these companies is 300 million blocks annually, or enough to pave a sixte foot roadway 750 miles long.

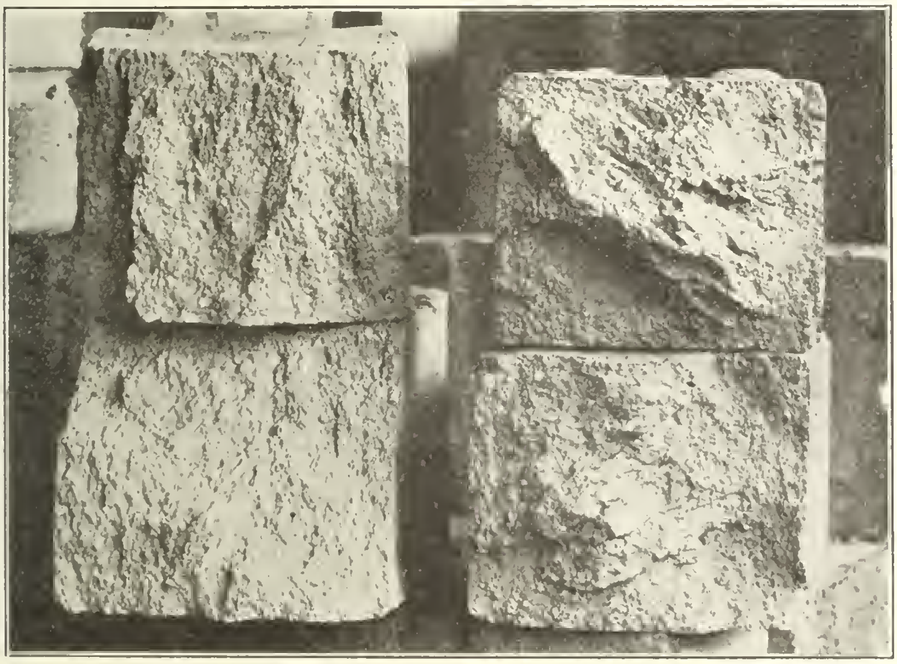
Hundreds of cities already have admitted Wire-Cut-Lug Block in their specifications and the numb of city engineers recognizing their merit is growing. See that your specifications are right. Wire-Cut-L Block never have been rejected where submitted.

WRITE US FOR FURTHER EVIDENCE

THE DUNN WIRE-CUT-LUG BRICK CO., Conneaut, Ohi

PATENTED IN THE UNITED STATES AND FOREIGN COUNTRIES

500,000,000
Wire-Cut-Lug Blocks



The two bricks to the left are wire-cut-lug and those to the right are repressed. Note the iniurious effects of the repressing

Reasons Why ?

Some of the reasons why the immense output of our licensees already arranged for next year will
bably not be enough to supply the demand for Wire-Cut-Lug Blocks are well shown by the above
ture of two paving blocks. The brick to the left of cut is a Dunn Wire-Cut-Lug Block. The fracture is
ooth and even, showing the greatest possible density. The block to the right is a repressed block made
the same material. The fracture laminations and change of form and structure caused by reforming
the repress.

There are many other reasons equally good to account for the popularity of Wire-Cut-Lug Blocks,
iong which we would like to call your special attention to the following:

BOND—The **uniform** lugs keep all brick an equal distance apart, admitting free flow of filler or bond-
g material. The rough, wire-cut surfaces, coming in contact with the filler, give many times greater bond-
g strength than is possible with the smooth surfaces of repressed brick.

SURFACE—The square edges make the smoothest pavement possible. Filler can be brought up even
th the surface without danger of its being broken away as from the smooth rounded corners of repressed
ick.

DURABILITY—Dunn's Wire-Cut-Lug Brick are of greater density than ordinary repressed brick, and
, therefore, more durable. The repressing process always decreases the density of brick.

STRENGTH—Rattler tests show a smaller percentage of loss from Wire Cut-Lug Brick than the
ne quality of repressed brick.

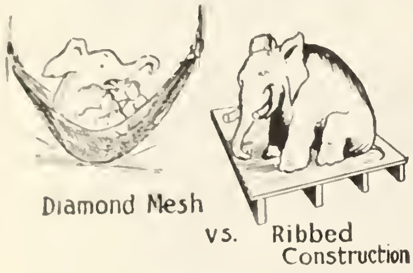
COST—Since the repressing process is eliminated in the manufacture of **Wire-Cut-Lug Brick,** the cost
manufacture, including the license fee, is not increased.

SEE THAT YOUR SPECIFICATIONS ARE RIGHT

HE DUNN WIRE-CUT-LUG BRICK CO., Conneaut, Ohio

PATENTED IN THE UNITED STATES AND FOREIGN COUNTRIES

The Court of Experience has Decided in Favor of Herringbone Lath



Why Herringbone?

Because Herringbone is the most rigid lath

Examine the Herringbone ribs.
They are the joists that stiffen the Herringbone Fabric.
They turn excess plaster back on the Trowel.
They prevent the clinch from dropping off.
They save cost in plastering.

Because Herringbone is the self furring lath

The longitudinal ribs act as furring strips. The transverse strands are NOT against the backing. The lath is fully enveloped in mortar. Furring strips are not essential.
Furring strips cost nine cents per square yard.

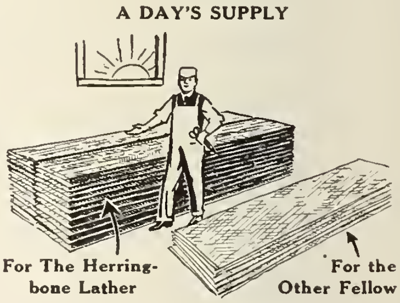
Best because it goes farthest

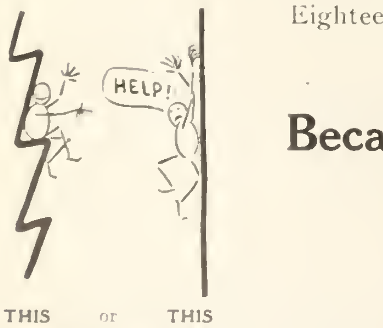
Because Herringbone requires no laps

Herringbone sheets have lock selvage edges.
They have 1½ inches end lap.
Herringbone lath lays up net as billed.
No material is wasted in side joints.
No material is wasted on account of crooked edges.
You don't pay for the end joints.

Because Herringbone is the most economical to erect

Herringbone stiffness means no bulges to be drawn flat.
Herringbone permits wider spacing of studs.
The selvage edge requires no wiring between studs.
One row of end staples holds both sheets.
Eighteen attachments per square yard does it.





Something of a stunt for wet mortar

Because Herringbone lath has the best key

Those ribs are shelves when seen from the back.
They prevent the wet mortar dropping off.
The twisted cross strands lock into the mortar.
Thus the lath is thoroughly sealed in.

Clarence W. Noble, General Sales Agent
117 Home Life Building, TORONTO
Metal Shingle & Siding Company, Manufacturers

? WHO SAID BRICK ?

SILICATE BRICK

Every Brick a Pressed Brick and Every Brick a Hard Brick

8 1-2 x 2 3-8 x 4 1-8 inches

THAT'S THE SIZE—THE LARGEST COMMON BRICK MADE IN THE OTTAWA VALLEY.
IT TAKES LESS BRICK WHEN SILICATE IS USED AND REQUIRES LESS MORTAR.

Three of Ottawa's Highest Buildings
BLACKBURN BUILDING, CANADA LIFE BUILDING, HOPE BUILDING
Erected in the heart of Ottawa. Silicate Brick was chosen for its durability and appearance

The leading architects to-day are specifying Silicate Brick. See that you investigate before you contract for anything else. In all colors.

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OTTAWA, ONT.

HARRY F. ALLARDICE, Manager **BERT W. CAMPSALL, Superintendent**

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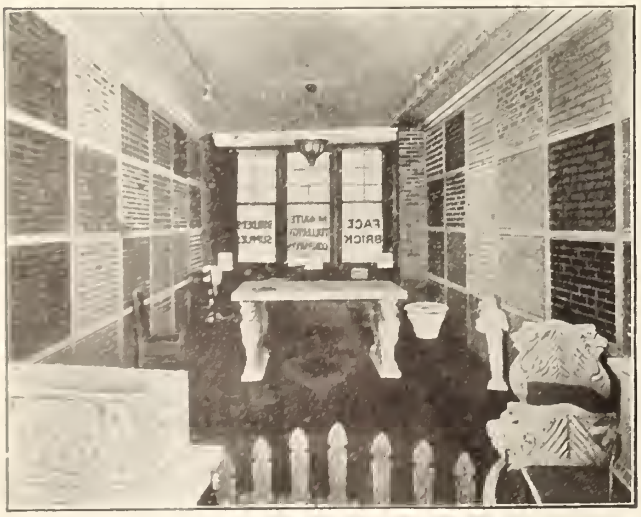
and Insure against extreme Weather Conditions, Wind, Rain, Heat or Cold

Brick construction stands where frame goes down. It resists the blasts of winter which penetrate the most carefully constructed frame structures. In a very few years the increase in initial cost of a house veneered with face brick is more than offset by the decreased cost of maintenance.

Build to Last



Our line of face brick comprises over one hundred varieties.

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The latest Sanitary Fixture for Bath Room and Wash Room.

Lavatory No. 801

Victorian Lavatories

are constructed upon simple lines with a neatly rounded surface eliminating the posibility of the accumulating of dust or grit.

They're constructed of the highest grade of semi-porcelain ware, having an unsurpassed glazed finish which gives a rich glossy effect and which is guaranteed not to "craze."

They're made in different designs with low and high back.

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Lighting Fixtures

of Latest Designs

our increased display facilities enable us to show you lines to advantage, and we can effect a saving on your lighting appropriation if favored with a call.

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Don Valley Bricks are used in the construction of the principal public buildings erected by the Provincial Government. They have been used in every important building in Canada from St. John to Vancouver during the past 12 years.

THE IMPORTANCE of the brick in the considerations of the appearance of a building as well as its durability has been in recent years rapidly increasing. The improved manufacture of bricks has brought to light many new and attractive features that have not only improved it as a building material but have increased its possibilities in the eyes of the architect as a factor to depend on to add beauty and color effect to architectural art. The unbroken record for good work done with

Don Valley Bricks

will recommend them to every architect and builder as the brick to rely on for **Perfect Results.** The high standard of quality is guaranteed not only by the integrity of the Name but also by up-to-date equipment of the most perfect process of manufacture. The color does not fade or change and the variety of shade effects shown in Don Valley Bricks make them especially popular for buildings where a color scheme has been combined with architectural design.

Specified by the leading architects for every building of importance.

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36 TORONT

Value and Economy in Porous Terra Cotta Fireproofing

THE VALUE and economy of Porous Terra Cotta Fireproofing for structural as well as for fireproofing purposes is now fully recognised and residence buildings are being built of this material in great numbers with extremely satisfactory results to both owners and architects. The strength and durability of this product depends on the strength and density of the clay of which it is made it is essential in being certain of the make of this fireproofing to specify

Don Valley Porous Terra Cotta Fireproofing

Our extensive clay beds are suitable in quality and our facilities are. unequalled for producing a particularly high grade hollow tile Our Porous Terra Cotta is tougher than other makes and is stronger and better for the fireproofing of columns and girders and has less waste than other makes. For lining and damp courses our porous terra cotta is superior in every way. By its use the cost of strapping for plastering is saved and wood trimmings can be nailed right on the bricks without plugging or wood blocks.

Royal Bank, Toronto

Eustace G. Bird, associated with Carriere & Hastings, Architects. Norcross Bros., Contractors.

Don Valley Porous Terra Cotta Fireproofing and Bricks used.

Lumsden Building, Toronto

J. A. McKenzie, Architect H. N. Dancy & Son, General Contractors.

Don Valley Fireproofing, Bricks and Tile used throughout.

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The attention of architects is respectfully directed to the higher grades of window glass for residences.

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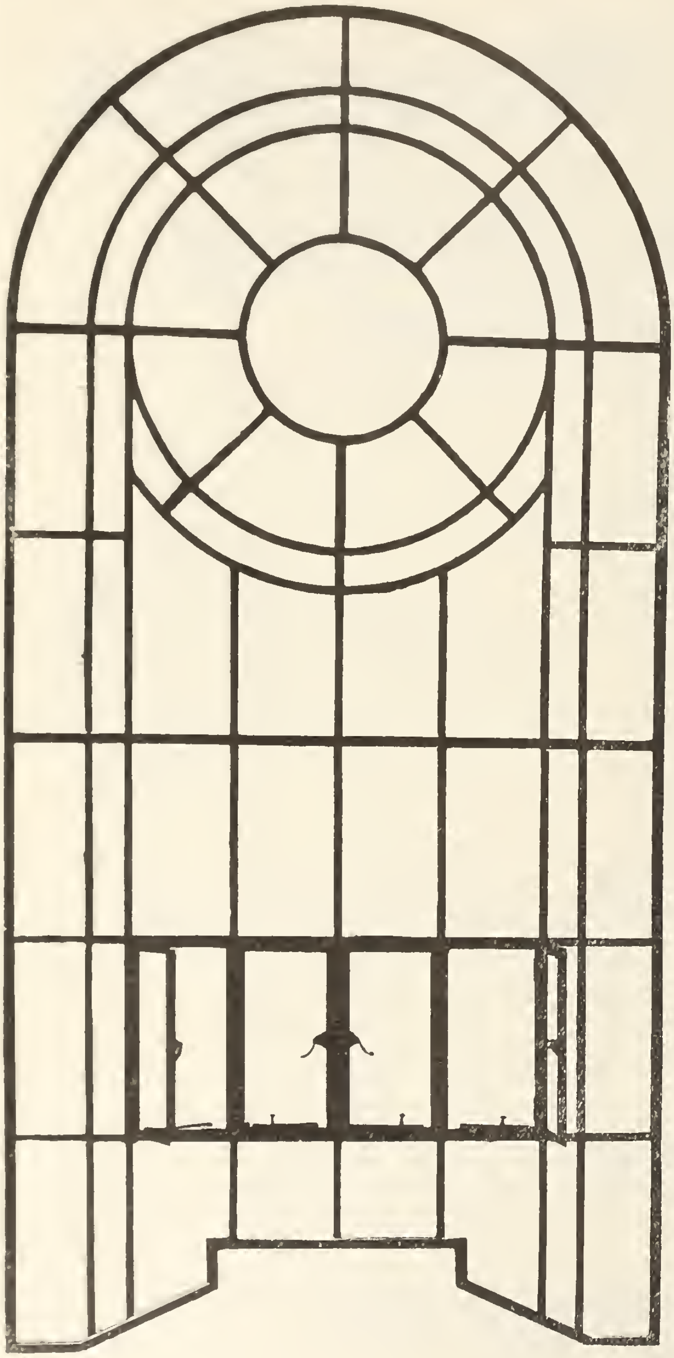

WE MAKE SPECIAL SASH

FOR

Special Openings

The cut as shown is one of the many specials we have made. This sash has replaced the wooden sash blown out of the Legislative Buildings at Regina in the recent cyclone.

Estimates

If you will send us preliminary drawings at our expense we will return them promptly with estimate.

Our Agents will be found in all the principal cities.

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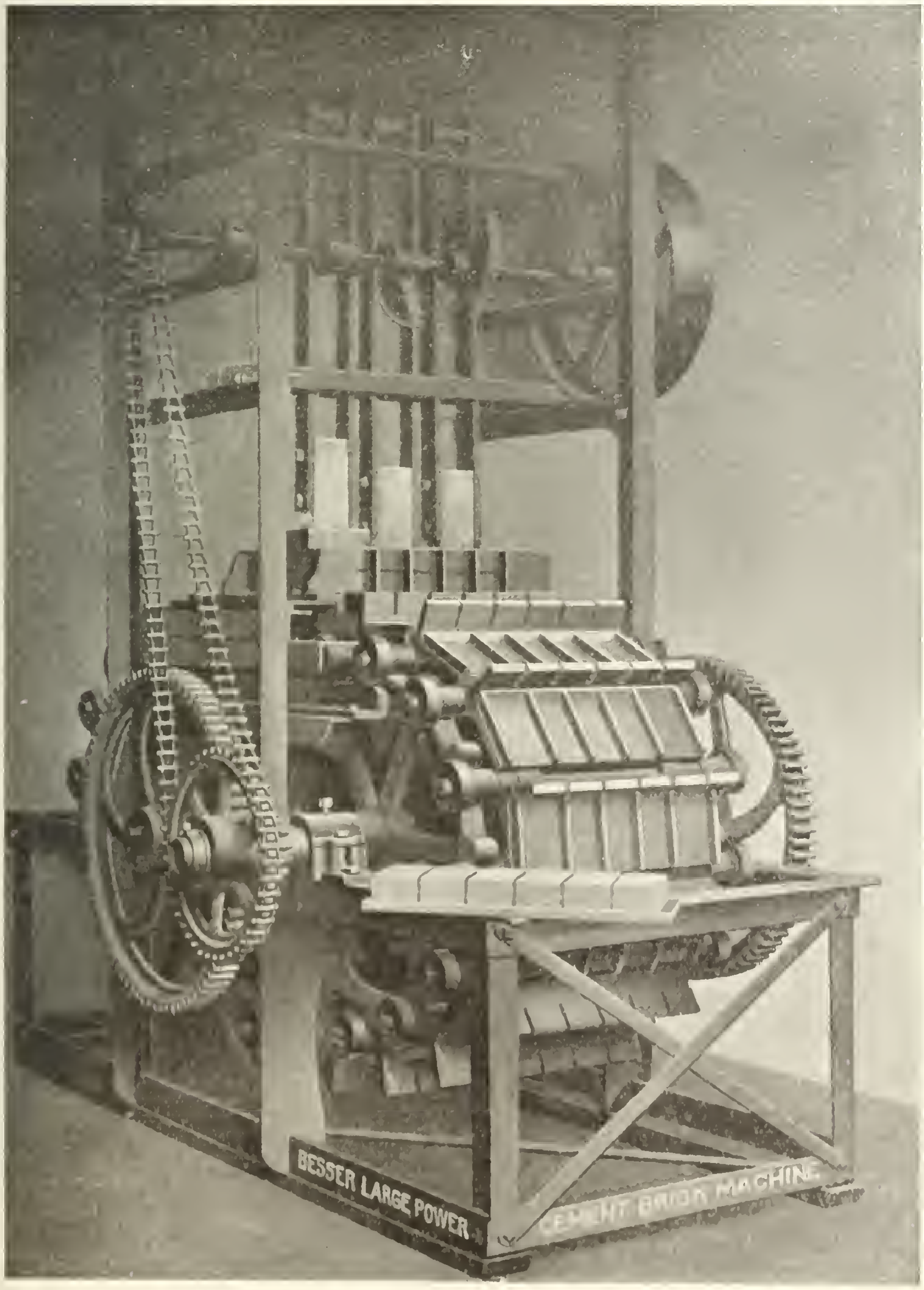
C. H. Webster, Calgary
Walker & Barnes, Edmonton
Evans, Coleman & Evans, Vancouver and Victoria

A Machine that puts the Cement Brick in competition with common clay brick

The cement brick business hasn't prospered like the block business. That's because the cost of cement brick at the factory has been too high. The hand brick machines and some of the power brick machines have made a good product, but it couldn't compete with common clay brick

The Besser Power Brick Machine has a capacity of from 50,000 to 60,000 brick per day. These brick are being made on this machine for from $3.50 to $4.50 per thousand. They compete in price and excel in quality the clay brick made by the old-fashioned, expensive kiln-burning methods.



This machine tamps the cement mixture into brick molds. The mixed material is elevated into a hopper, which feeds into sets of molds revolving on a cylinder. These molds pass under automatic power tampers which tamp the molds full. The surplus mixture is scraped off automatically, the face of the brick is troweled and two mechanical arms pick up the palletfull and deposit it on the kiln car.

No human hand touches the material from the mixer to the curing rooms—the machinery does it all.

The result is a dense cement brick, hard as flint. It is stronger, more waterproof than a clay brick and can sell for the same, or a lower price.

We make a machine of smaller size with a capacity of 25,000 brick per day. Ask for our Power Brick Machine Catalog.

BRICK ON THE FLAT

This machine makes a first class common building brick. They are made on the flat, which has many advantages. It allows the use of **wet material**, which means everything in the manufacture of a good brick. The use of enough water gives a hard flinty product and is much different from the excessively dry concrete, generally used.

Making them on the flat allows us to trowel the face and leave the flat side more rough. In this way the brick hold the mortar better and the face has a nice appearance, as the trowelling is applied where it belongs

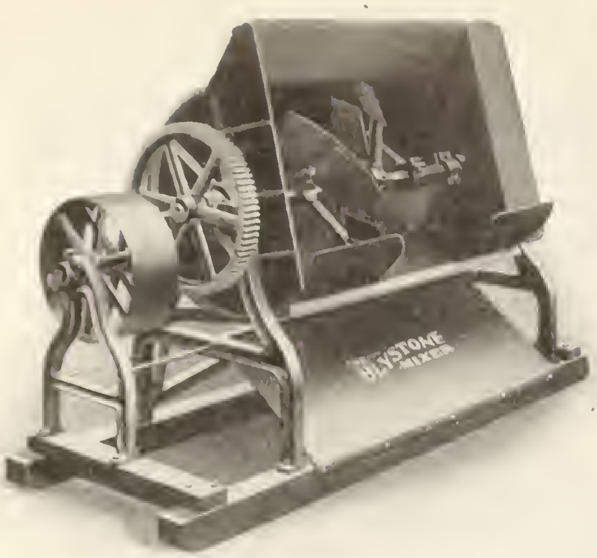
THE PROFITS

We are prepared to show that the manufacture of cement brick with this simple, large capacity machine is one of the most profitable enterprises that you can take up. It is a large factory proposition and the lessened cost of production removes you from competition with cheap methods.

Estimates of profits, etc., furnished upon application. To our customers we furnish plans and specifications, and always supply our expert to start the machinery.

WOODSTOCK WIND - MOTOR CO., Limited, WOODSTOCK, ONTARIO

Use a Blystone



Blystone Skid Mixer
Easy to work and easy to clean

An Interesting Letter

EDW. W. WELLS ERICK J. LARSON

WELLS & LARSON

Concrete Building Blocks of all Designs, Colors and Dimensions

Also Watertables, Coping, Chimney Caps, Fancy Porches and Dimension Stone of all kinds

Our Specialty Tycrete Blocks, Absolutely Waterproof

Moline, Illinois, July 13th, 1912.

Blystone Machinery Company,
Cambridge Springs, Pa.

Gentlemen:—We received mixer July 8 in good order, and will say we are very much pleased with it. We certainly could not ask for a better mix. It is all and more than you claim for it; capacity limited only to the amount of material that can be gotten into it. We have tried several mixers but must say the Blystone has them all "skinned a mile" for rapidity, simplicity and a perfect mix. We would not part with it for double the price if we couldn't get another. The Blystone will pay for itself in thirty days in any concrete plant. Owing to some delay in remodelling our plant, we did not set up the mixer till the 10th, but just two batches satisfied us that the Blystone was "it" with a great big capital "I."

A great many concrete men have seen our mixer in action and all say it is perfect.

Wishing you the success the Blystone merits, we remain, Yours very truly,

WELLS & LARSON,
Per W.

(The above letter was unsolicited).

Blystone Mounted Mixer with Power

The Best Batch Mixer

Blystone Batch Mixers are expressly intended to effect a saving in the mixing of concrete and at the same time do a more thorough, more continuously uniform job.

They have proven through the hardest kind of service and are without question the most practical, most efficient and most economical mixing equipment for general construction, sidewalk and paving work, also for block, brick or tile plant work.

They are thoroughly simple in construction, durable, and can be operated rapidly.

Blystone Batch Mixers give a thorough mix. Our Blystone reverse spiral paddle system turns the material over forty times in one minute. This operation thoroughly coats every particle of the aggregate with cement mortar.

They can be filled while in motion and material is always in full view. The material is discharged while machine is in motion.

The Blystone skid mixer is particularly suitable for block, brick and tile plants. It is economical. It mixes concrete far cheaper than can be done by hand. It is low enough to be easily charged—the low platform enables materials to be dumped direct from barrows.

For sidewalk, paving and general construction work the Blystone mounted mixer with power equipment should be used. This machine has all the many Blystone advantages—it occupies little room and the mix can be dumped into the forms.

When you buy a mixer figure on what you are paying for. Don't buy a lot of attachments that add to the cost of the machine without adding one cent to its actual working value.—Buy a Blystone Batch Mixer. Mixers for Canadian trade made in Canada.

Send for Catalogue

The Blystone Machinery Co.
61 RAILROAD STREET
Cambridge Springs, Pa., U. S. A.

Full line of Blystone Mixers carried in stock by
The A. R. WILLIAMS MACHINERY COMPANY, Limited
Contractors Department No. 1, TORONTO, CAN.
Sole Distributors for Canada

CORINTHIAN STONE

TRADE MARK

REGISTERED

Is the only manufactured stone which can be cut and dressed, to give the same appearance as NATURAL STONE.

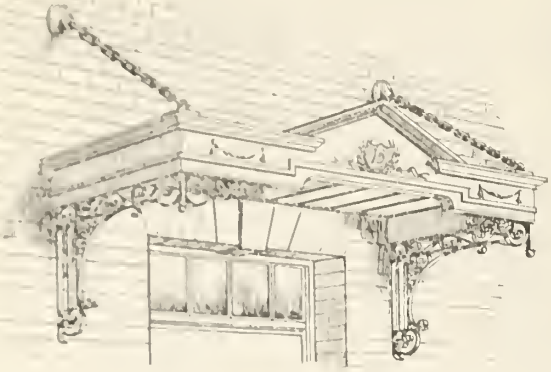
ROYAL BANK FRONT, INGERSOLL, Erected 1908

Architects, Messrs Taylor & Taylor, Brantford. Corinthian Stone is especially adapted for Bank Buildings, for Carved and Ornamental work it stands alone, all arris and angles being sharp and clearly defined. Specify it.

The Corinthian Stone Co. OFFICE AND WORKS: G. T. R. JUNCTION, GUELPH, ONT.

Agents at Ottawa: Canadian Agency & Supply Co., 5 O'Connor St., Ottawa

Agents at Toronto: E. MacDonald & Sons, 176 King St. E., Toronto



We Make Things of Wrought Iron Brass and Bronze

Wrought Iron Door Grills
" " Brackets
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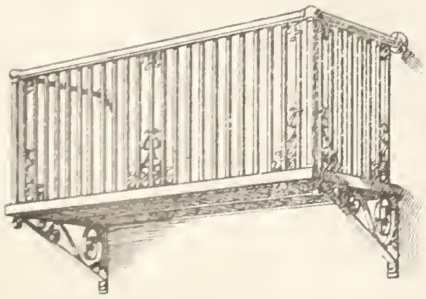
Lanterns and Lamps
Lamp Standards
Grills and Railings
Stair Railings
Fire Escapes
Metal Lockers

We make a specialty of executing intelligently, special designs for architects, in iron, brass, or bronze.

Catalogue on request.



Dennis Wire & Iron Works Co., Limited
London, Ontario
Toronto Office, 36 Lombard Street

Ornamental Iron

WE MANUFACTURE

Lamps
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Balconies
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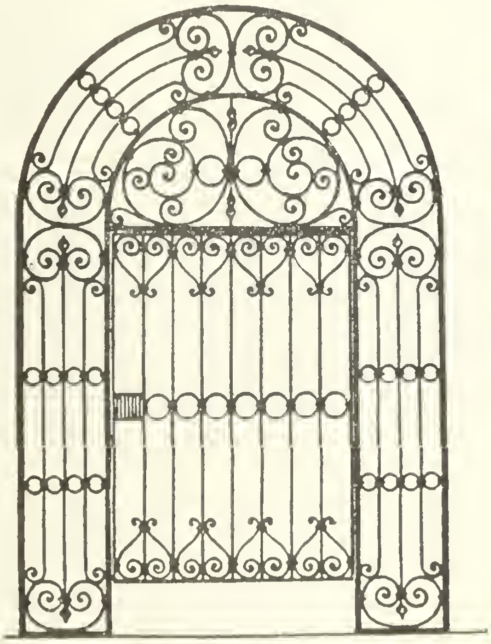

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Stairways in Wrought and Cast Iron
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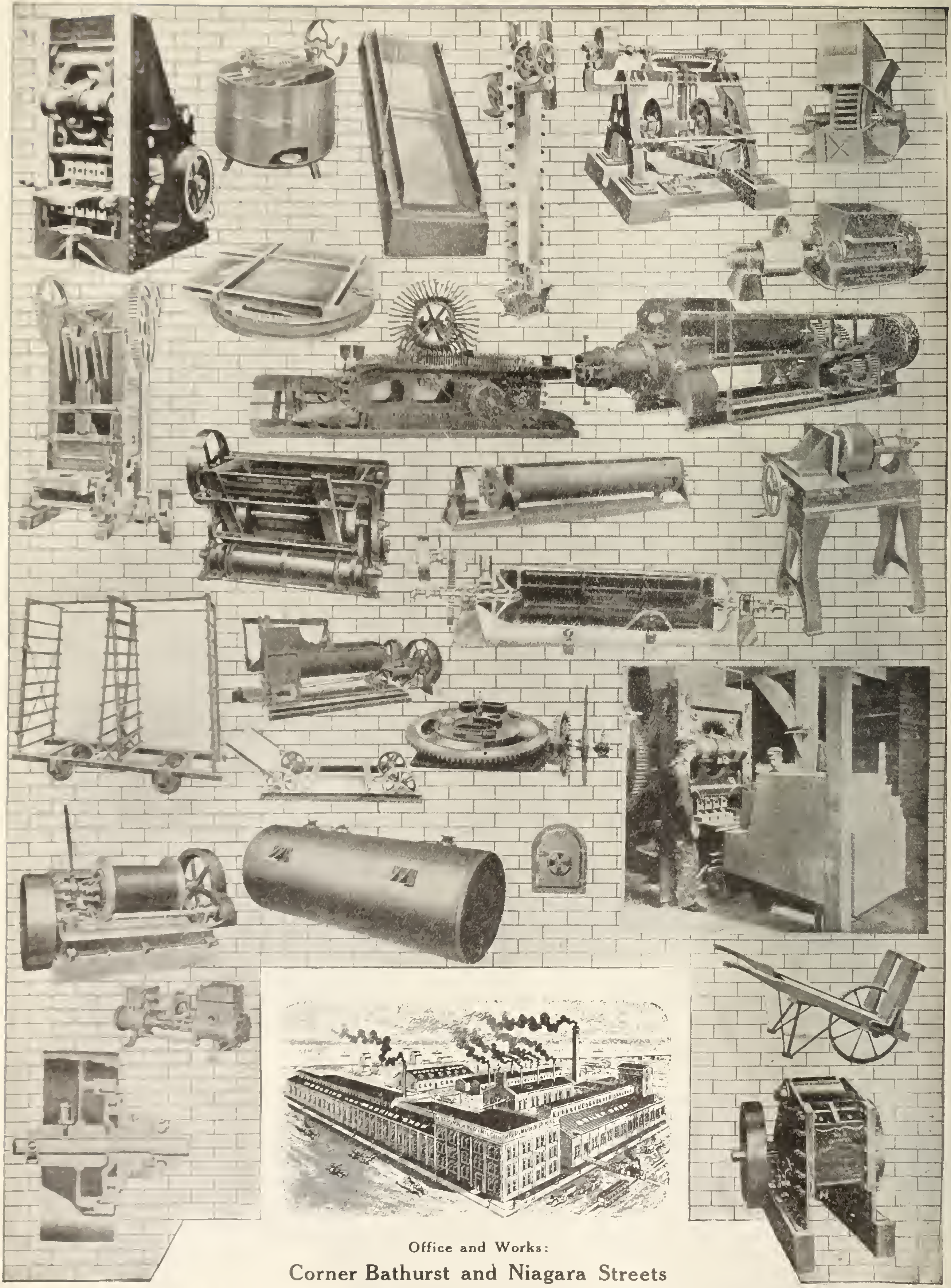
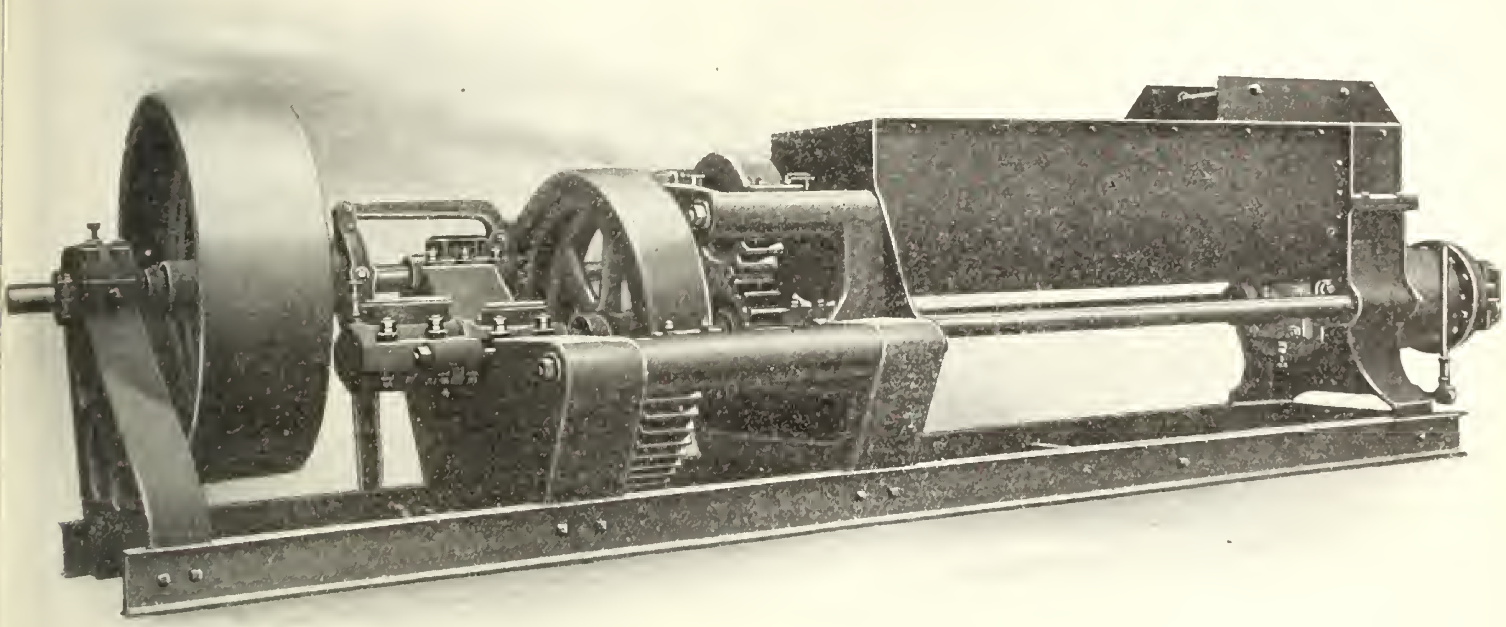
Phone Beach 1192



Office and Works:
Corner Bathurst and Niagara Streets

The Berg Machinery Manufacturing Co., Limited, TORONTO ONTARIO'



Dependable Brick Making Machinery

OUR Brick Machines are built in several types and sizes, suitable for an output of 10,000 to 150,000 brick per day. We have Machines and Cutters especially designed for drain tile, fireproofing, etc., and are prepared to furnish the entire equipment for modern plants of large or small capacity, for the manufacture of Building, Paving or Fire Brick, Drain Tile, Fireproofing, Electrical Conduits, Radial Chimney Blocks, and similar products.

The Union Machine shown above is an example of our heavy direct geared auger machine, with Pug Mill combined. Note the simplicity of the gearing arrangement and the design for convenient access to all working parts.

Our automatic Cutters have many points of advantage. They are built in two types, Rotating and Reciprocating, with several sizes of each. Adapted to the cutting of almost anything made on an auger machine, including the largest sizes of fireproofing.

We have complete testing facilities, and give careful attention to clay tests; also offer the services of our Engineering Department in the design of new plants, or re-design of old ones. Tell us your needs.

E. M. FREESE & CO. - Galion, Ohio, U.S.A.

Canada Clay requires the

STEVENSON MACHINERY

For Best Results

Famous the World Over for

Strength - Durability - Efficiency

9 ft. iron frame

Grinding or Tempering Pan

Built for heavy duty grinding and tempering of silica, fire clay or limestone.

Frame extra heavy.

8 ft. iron frame

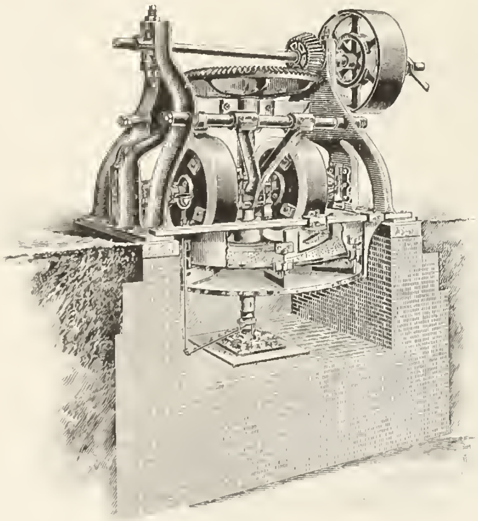
Tempering Pan

Specially adapted for tempering clay or shale, for sewer pipe, hollow ware and tile.

10 ft. iron frame

Heavy Duty Grinding Pan

One of the latest improved pans on the market. Constructed for heavy duty work and durability. Made with adjustable scraper and other improvements.



9 ft. iron frame

Grinding Pan

Pulley or Motor Drive. Rigid, and built to stand severe work.

7 ft. iron frame

Dry Grinding Pan

This is what is known as 7 ft. 7¾ in. pan, and is the same as 9 ft. pan, but reduced in width 18 ins.

5 ft. iron frame

Grinding and Mixing Pan

Pulley or motor drive. Thoroughly efficient and especially adapted for sand and clay. Special adjustments for line shaft. Our wet pans same style excepting solid bottom instead of screen bottom.

STEVENSON PRESSES

For Making Large Drain Tile or Sewer Pipe

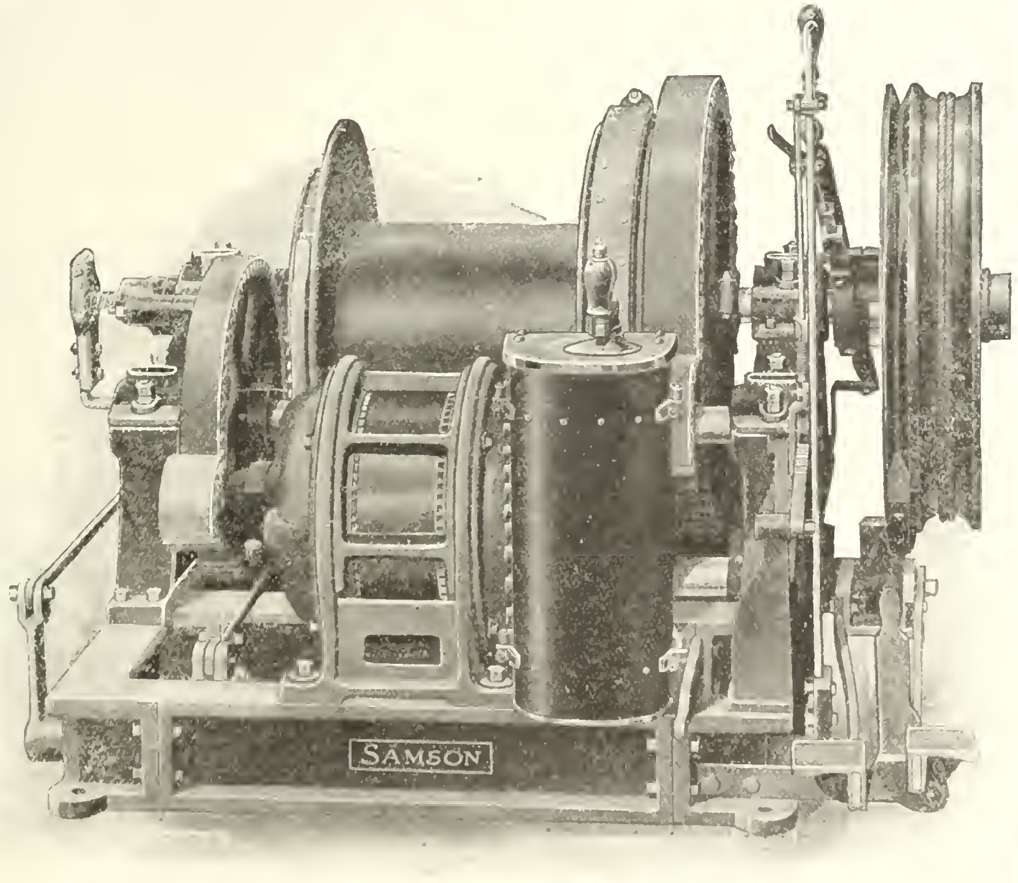
There is money in big tile, and the largest profits are made by plants which can turn out tile up to 36 ins. diameter.

The Stevenson Press will enable you to meet all competition and to operate your plant at a profit when others are losing money. Consult us about the making of big tile.

THE STEVENSON CO., - Wellsville, Ohio

CONTRACTORS

Electric Hoisting Engines



Building Contractor's Electric Hoist with Material Elevator Sheave

Electric Hoisting Engines save the wages of one man.

They save power because power is only used while actually hoisting.

They also do away with coal, water, boiler and smoke troubles.

These machines are light, portable, powerful and convenient to operate. Being designed expressly for building contractors they embody some very desirable features. Specially designed hoist motors are used insuring continuous, reliable service.

DOUBLE AND TRIPLE DRUM ELECTRIC DERRICK HOISTS

CANADIAN INGERSOLL-RAND COMPANY
LIMITED

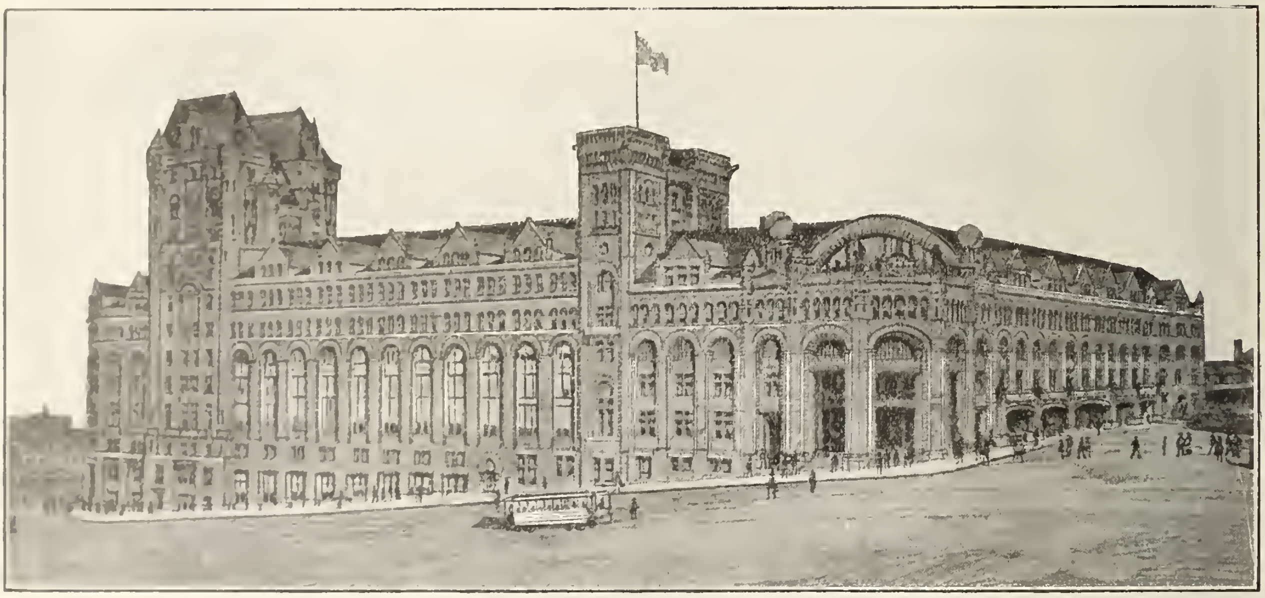
COMMERCIAL UNION BLDG. - MONTREAL, CAN.

MONTREAL COBALT WINNIPEG ROSSLAND
SYDNEY TORONTO SOUTH PORCUPINE LETHBRIDGE VANCOUVER

THE
LINDE·BRITISH
REFRIGERATION
COMPANY LIMITED

has the largest output in the world of refrigerating machinery.

Plant in course of construction
at Windsor Station



A RECENT INSTALLATION—C. P. R. WINDSOR ST. STATION

The largest contract for installation of refrigerating plant in any hotel or railway station in Canada

Established in Great Britain 27 Years. *Established in Canada 18 Years.*

Operating in every country in the world, with plants or distributing offices at

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Birmingham
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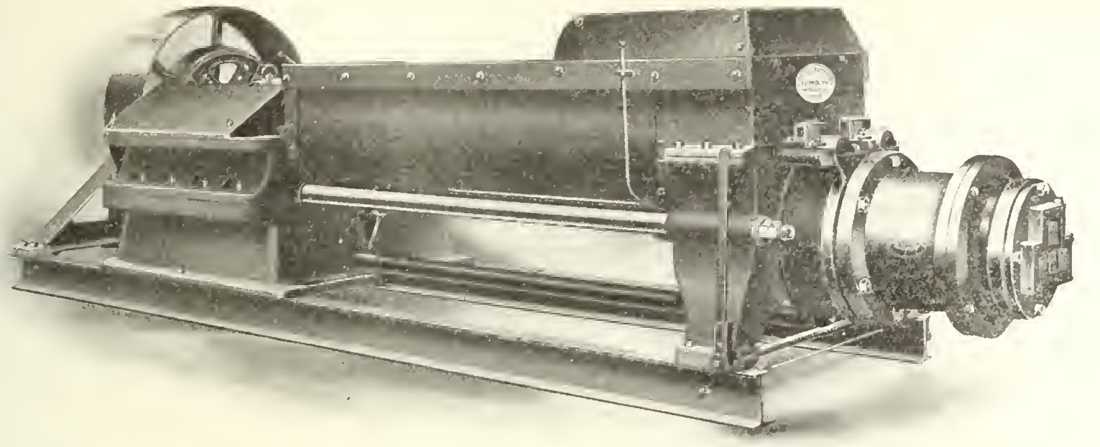


Special Premier Hollow Ware Machine

A machine built in response to, and which has successfully met, the large demand for a hollow ware machine that would make that class of ware and do it with a capacity that would permit of its being made profitably—and also stand up under the enormous strain to which a machine of this kind is subjected. In other words it is a machine for the ultra-particular manufacturer.

This machine is assembled on heavy steel I-beams and is entirely self-contained. All of the gears run in a bath of oil and are enclosed in a dust proof chamber and the gears can be furnished either in cast-steel or all cut-steel, as desired. Augers and nozzles of special shapes and sizes are furnished for different purposes, so that either small or large shapes can be easily made. It is with out doubt the best and most up-to-date machine for the purpose on the market to-day.

We have also designed a similar machine for the manufacture of brick that is deserving of your most careful consideration.

These are, however, only a very small part of our line of Clayworking Machinery as our line is most complete. There are more of our Automatic Cutting Tables in use than all others combined. Our offering of Crushers and Disintegrators cannot be excelled. So with all our different products. Drop us a card asking for complete information on any thing in which you may be interested.

The J. D. Fate Company

Plymouth, Ohio., U.S.A.

A. E. Davidson, Western Rep., 604 Blake-McFall Bldg., Portland, Ore.

THE JUSTICE RADIATED HEAT DRYER—SUCCESSFUL RESULTS ALWAYS CERTAIN

Established 1886

The Columbus Brick and Terra Cotta Company

Columbus, Ohio, U. S. A.

——*MANUFACTURERS OF*——

High Grade

FACING BRICK

DRY PRESSED and IMPERVIOUS
Ivory, Gray, Buff Speckled and Gray Speckled
STANDARD and NORMAN SIZES

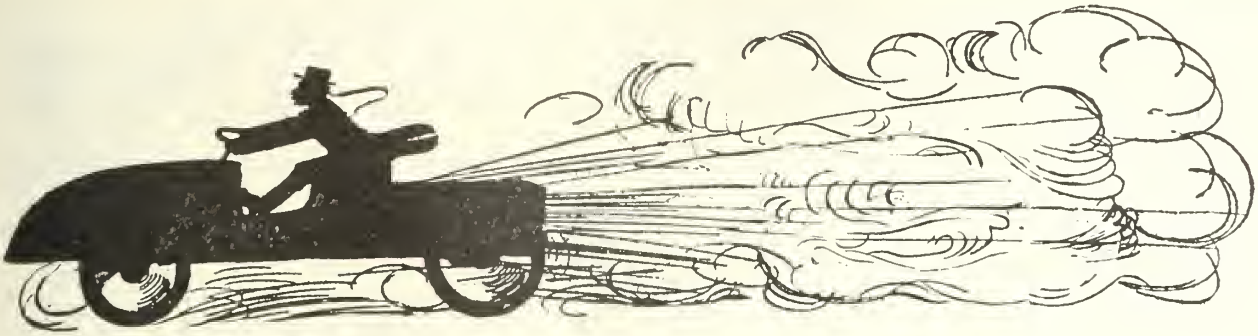
We are the originators of the famous "ASTRAKHAN" Brick in Red, Buff, Brown, Gray, Granite, Flemish and Onyx shades; acknowledged by Architects and Builders to be the best rough texture brick on the market today.

We have been manufacturing brick for over twenty-five years, during which time this Company has been under the same ownership and management. Our brick are known throughout the United States from the Atlantic to the Pacific and from the Lakes to the Gulf, and in Victoria, Calgary, Winnipeg, Montreal, and other points in Canada.

It would be impossible to have accomplished such results, without the highest merit of quality and the greatest service to customers.

Agencies in Canada:

HAMILTON, Black Building Supply Co., Ltd.
BRANTFORD, Black Building Supply Co., Ltd.
TORONTO, Black Building Supply Co., Ltd.
CALGARY, The Waite-Fullerton Co., Ltd.
HALIFAX, Brookfield Brothers, Ltd.
MONTREAL, David McGill
WINNIPEG, The Waite-Fullerton Co., Ltd.
SASKATOON, The Waite-Fullerton Co., Ltd.
VANCOUVER, The Ritchie Contractors' Supply Co.



Are You in a Hurry?

for

CRUSHED STONE

for Concrete, Fireproof Construction, Road or Sidewalk Work.

OR

CRUSHED GRANITE

for Floors and Sidewalks.

We Can Supply You

The Rogers Supply Co.

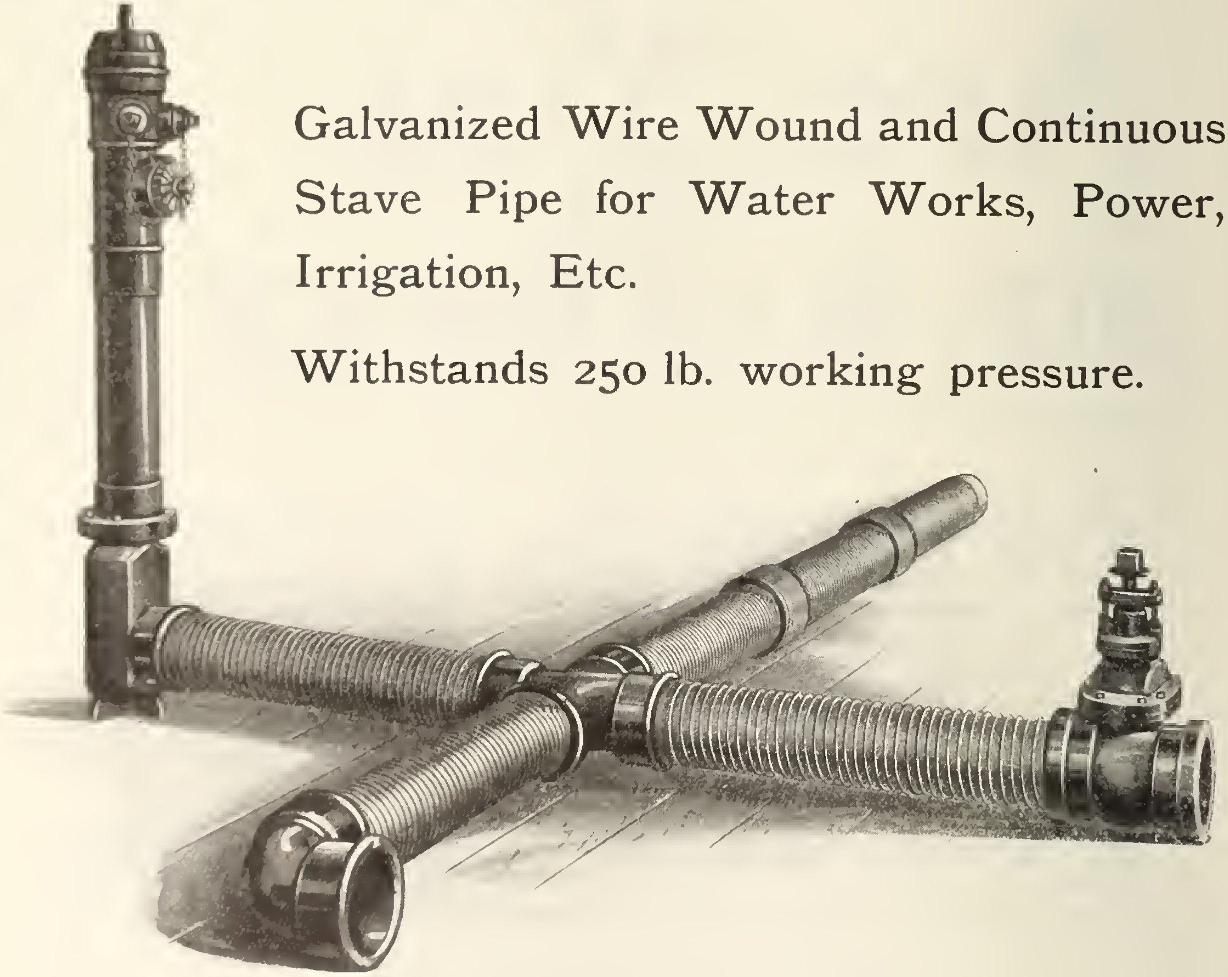
28 King Street W. TORONTO Main 4155

Shipments Grand Trunk R. R. or Canadian Pacific R. R Delivery

Wooden Water Pipe

Galvanized Wire Wound and Continuous Stave Pipe for Water Works, Power, Irrigation, Etc.

Withstands 250 lb. working pressure.



Not affected by Frost, Corrosion, Electricity or Acid. Water Works Systems installed. Prompt attention to inquirers. Write for prices.

Manufactured by

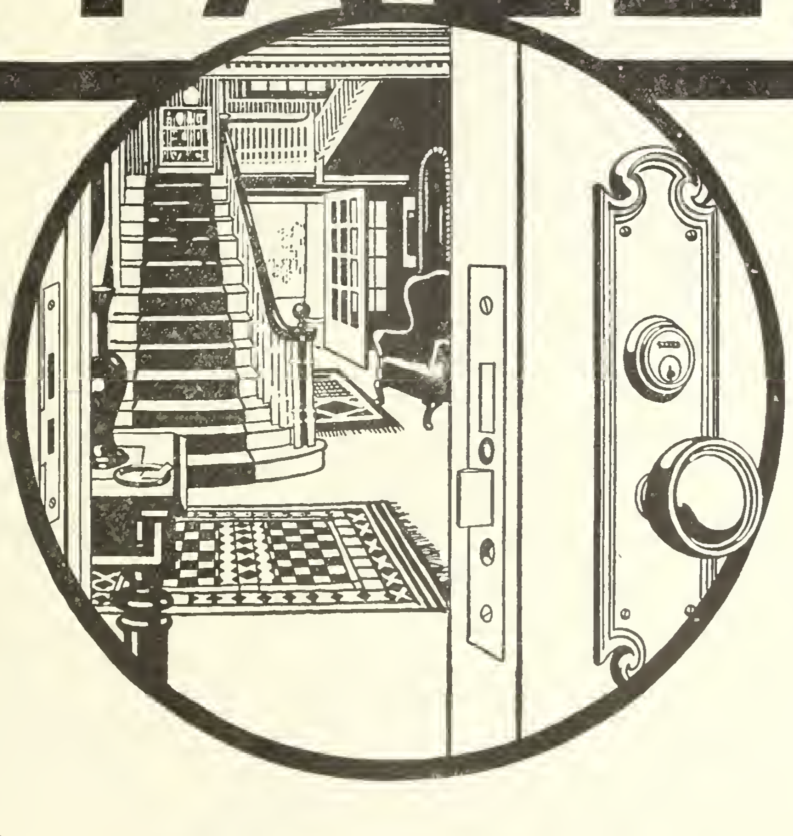
Canadian Pipe Co., Limited

Factory: 550 Pacific St., VANCOUVER, B. C.

P. O. BOX 915.

Look for the Name Yale on Locks and Hardware

YALE



WHEN you specify or apply Yale Locks and Builders' Hardware you are giving your client full advantage of the Yale Idea, the highest possible security in locks and fastenings, associated with hardware of character appropriate to its surroundings. And remember that Yale Products sold in Canada are now made in Canada.

Yale Products include not only locks and Builders' Hardware, but Yale Padlocks, Night Latches, Door Checks, Triplex Blocks and Electric Hoists. Write for interesting printed matter, and ask also for two little books entitled "The Quiet Life" and "The Book for Burglars."

Canadian Yale & Towne Limited

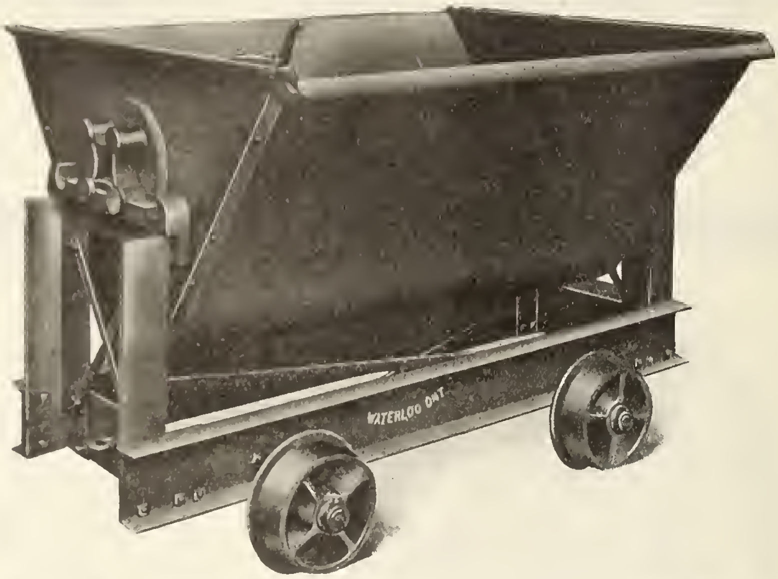
Makers of YALE Products

General Offices and Works; St. Catharines, Ontario

Canadian Made Steel Dump Cars

Simplest, Strongest, Best

We make 'em in any size or gauge



We also make Winding Drums and Portable Track

Bechtels Limited **Waterloo, Ont.**

Enameled Brick

in Standard Colors and Sizes

BRIGHT AND MATT FINISH

Prominent Office Buildings, Apartments and Stores etc. erected for over fifteen years stand up in evidence of the DURABILITY of

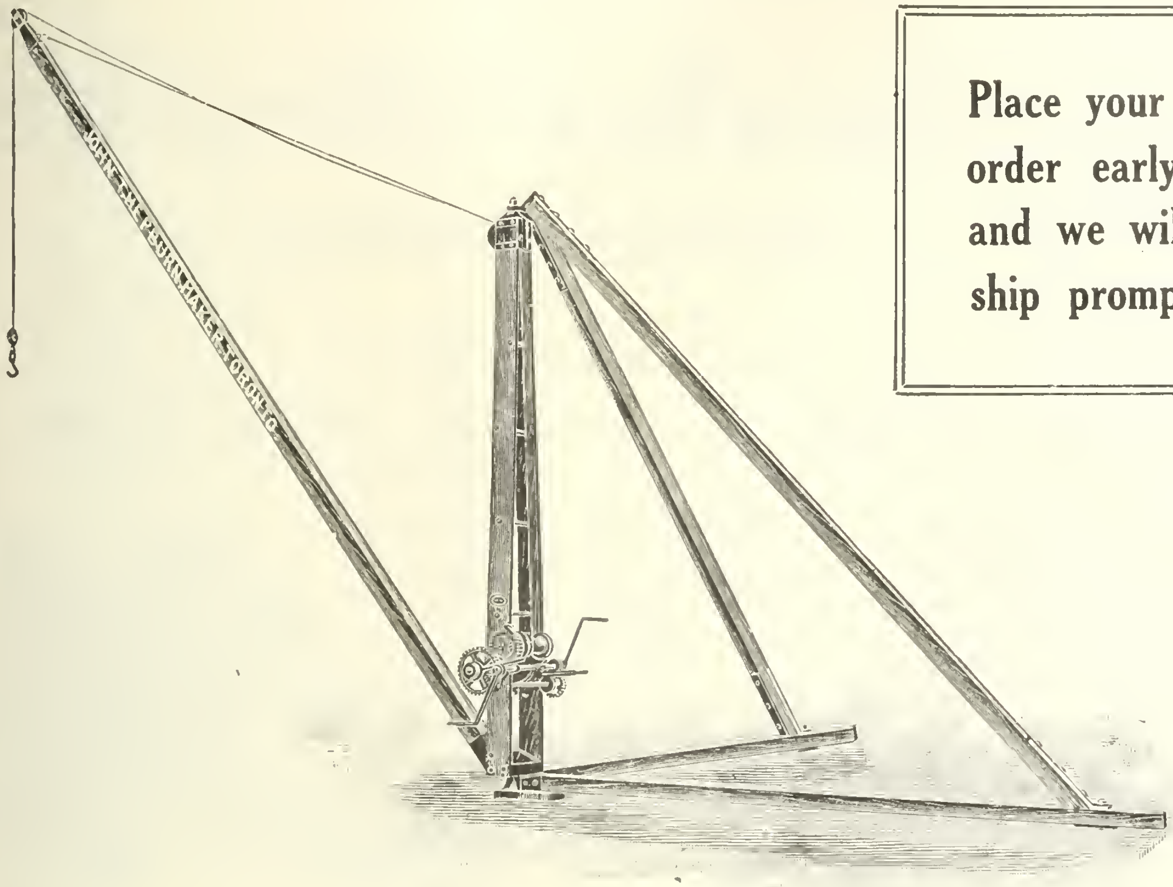
"American" Enameled Brick

for Exterior and Interior use.

Samples submitted upon formal request by letter.

American Enameled Brick & Tile Co.

1182 Broadway, NEW YORK


JOHN T. HEPBURN MAKER TORONTO

Place your order early and we will ship promptly.

The Proved Economy of Hepburn Scotch Derricks

If you cut the time upon a job and still do the job right, you are time and money in pocket. When you reduce labor by better methods and better equipment you also save time—and save money. You can get through more work, in less time, and at a better profit. Hepburn Derricks represent bed-rock economy in construction work equipment.

They have weight where weight is needed. They have great strength. Yet every part is so well proportioned, so accurately and staunchly built, that a Hepburn Derrick is more easily operated and will do more work than any other derrick on the market.

Ask any man who has used them.

Made in standard sizes—one-half ton upwards. Interchangeable parts kept in stock for prompt shipment. Operated by hand or power. Fitted with single and double-purchase gears, band brake, and high-grade wire heaving rope. Interchangeable parts always in stock.

Iron Founder, Crane Builder and Machinist

JOHN T. HEPBURN

18-40 Van Horne St. Toronto, Can.

Wettlaufer Brothers

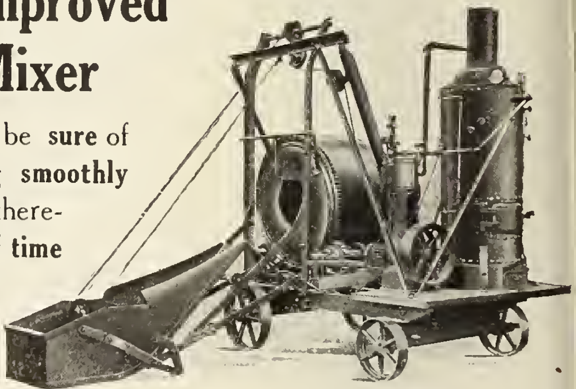
MIXERS---PUMPS

Contractors

avoid all delay on your Concrete Work by using

Wettlaufer Improved Heartshape Mixer

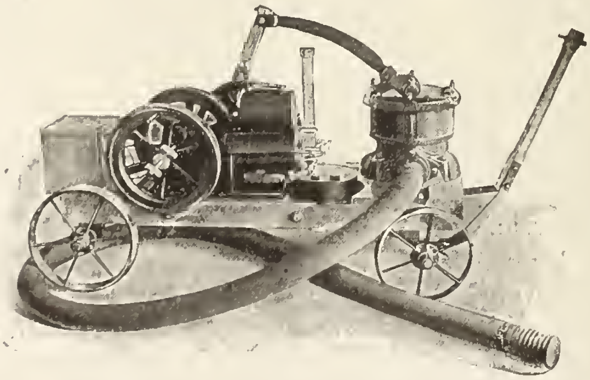
Then you will be **sure** of the job running **smoothly** and **easily** and thereby **save** yourself **time** and **money** on the contract.



The Wettlaufer Heartshape Mixer will mix right up to capacity every minute of its operation.
Economical Working—Low Running Cost—Automatic Operation throughout.

The Wettlaufer Pump

Here is a pump that will pump out your abutments and foundations, or in any place where you are troubled with water, at an average rate of 3,000 gallons per hour.



Saves Time and Money

Does more than the work of two men at a cost of not more than 35c. a day—that is a direct saving of time, labor and money—a saving that will very soon pay the cost of the pump.

Send for catalogue of ***Mixers*** *and* ***Pumps***
and come and see them working any time at

AGENCIES:
A. R. Williams Machinery Co.
15 Dock St., St. John, N. B.
Lavalle Ross, Limited
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WETTLAUFE
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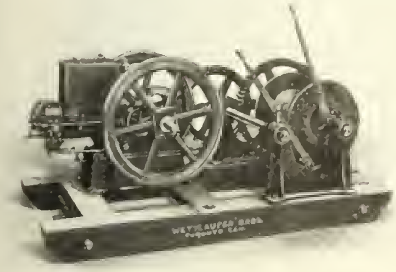
Contractor's Equipment

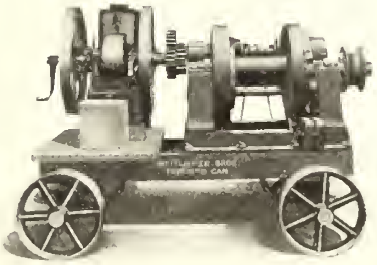
HOISTS---CRUSHERS

Take Advantage

of the benefits of up-to-date equipment
Investigate the Merits of



Wettlaufer Hoists

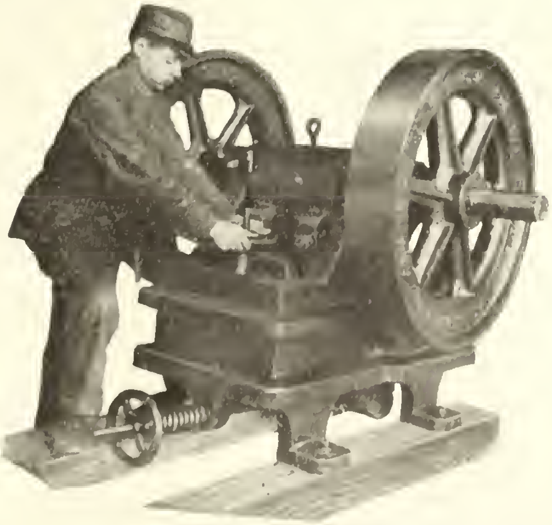


These have already proved the most useful and complete hoists for all building and contracting purposes. Their compactness, size and general handiness give them great advantages over the ordinary large cumbersome hoist. Their capacity for work and general utility are unlimited.

Steam, Gasoline and Electric Power—Single and Double Drum Reversible. Power for any Capacity.

The Mitchell Crusher

will crush the hardest of material including field rock and boulders to any required sizes for general contracting purposes. Does the work of any two other machines as it will handle three inch and four inch material and reduce it in one operation to a coarse sand fineness.



Means more work and bigger Profits

This crusher forms a portable plant that would greatly increase the earning capacity of any Contractor's or Road Builder's equipment. It is often so difficult to secure rock on the job, of the required size at the right price. This outfit is specially designed to fill this need. Adaptable to all conditions.

Send for catalogue of **Hoists** *and* **Crushers**
and come and see them working any time at

BROTHERS

venue, TORONTO, Ontario
15 Lagauchetiere Street W.

FACTORIES:

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Circular Diamond Saws

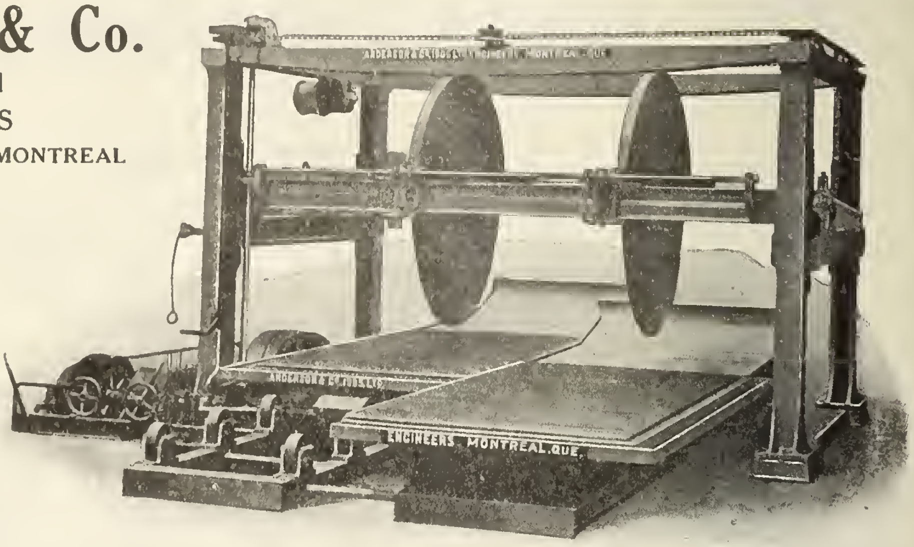
For Limestone, Marble and Sandstone

Geo. Anderson & Co.
of Canada, Limited
SOLE MAKERS
Office: 86 Notre Dame St. West, MONTREAL

BRANCH OFFICES AND WORKS
London, England, 82 Victoria St., S.W.
Newark, N.J., U.S.A. 420-422 Ogden St.
Montreal Works, 157 Craig St. West
Head Works, Carnoustie, Scotland

MAKERS OF

**Gangs, Planers, Marble Dressers, Derricks, and Electric Traveling Cranes up to 50 tons, Quarry Machinery, Gas Engines and Producer Plants.
10 H. P. to 150 H. P.**

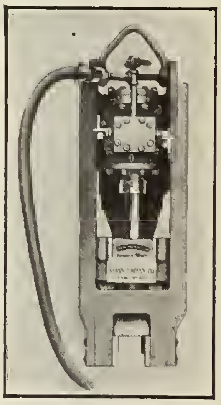


Anderson's Rising and Falling Diamond Saw, made under British and U. S. A. Patents 209179, 657262 SINGLE AND DOUBLE TABLES

About 50 of the above Machines at work in Canada

No. 3 DRIVING 8″ x 3″ Tongued and Grooved Sheeting

New Monarch Steam or Air Pile Hammer



It is the quickest acting Hammer on the market and strikes the heaviest blow.

For further particulars write

Henry J. McCoy Co.
65-67 Dey St., NEW YORK CITY, N.Y.

17 City Engineers

tell their good opinions about "Canton" Shale Paving Brick in a Booklet

"What Experts say about Metropolitan Paving Brick"

Write us for Booklet—It's Interesting

"Quality is Economy" in Paving Brick

"Best Paving Block Made"

"Metropolitan Block" Make Permanent Pavements

The Metropolitan Paving Brick Co. - - - Canton, Ohio, U.S.A.

The Thew Shovel for Road Construction

The general use of the Thew Shovel in road building and street grading is conclusive proof that it is adapted to the conditions, economical for the purpose and efficient in operation. The following list of some of the contractors, in the State of New York alone, who have used and are using The Thew No. O Full Circle Swing Shovel in this class of excavation will indicate the popularity of the machine and its undisputed merit on such work :

Joseph Walker, New Paltz, N.Y.
H. B. Sproul, Peekskill, N.Y.
S. B. Van Wagnen, Rondout, N.Y.
James E. Martin, Poughkeepsie, N.Y.
F. G. Fowler Const. Co., Mt. Kisco, N.Y.
Brown & Lowe, Schenectady, N.Y.
Buckley Const. Co., Plattsburg, N.Y.
Newport Const. Co., Newport, N.Y.
Monroe Roads Co., Pittsford, N.Y.
Santanoni Const. Co., Newcomb, N.Y.
J. D. Moynehan Const. Co., Mohawk, N.Y.
Merritt Const. Co., Tuckahoe, N.Y.
Thos. Fitzgerald, Fredonia, N.Y.
Shanley-Morrissey, Inc. New York, N.Y.
M. F. Dollard, Albany, N.Y.
M. A. Aldrich, Poughkeepsie, N.Y.
James Anderson & Sons Co., Albany, N.Y.
Raymond M. Booth, Albany, N.Y.
Barber Asphalt Co., Buffalo, N.Y.
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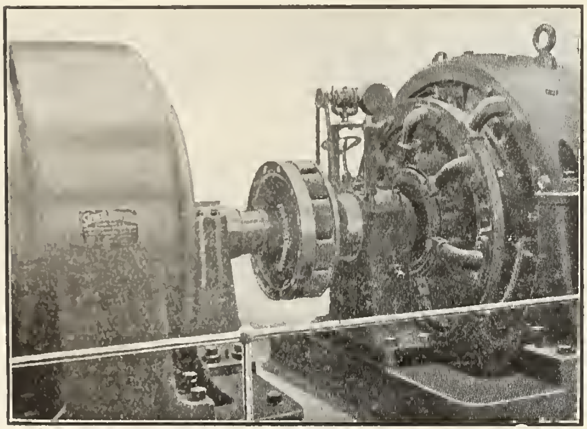

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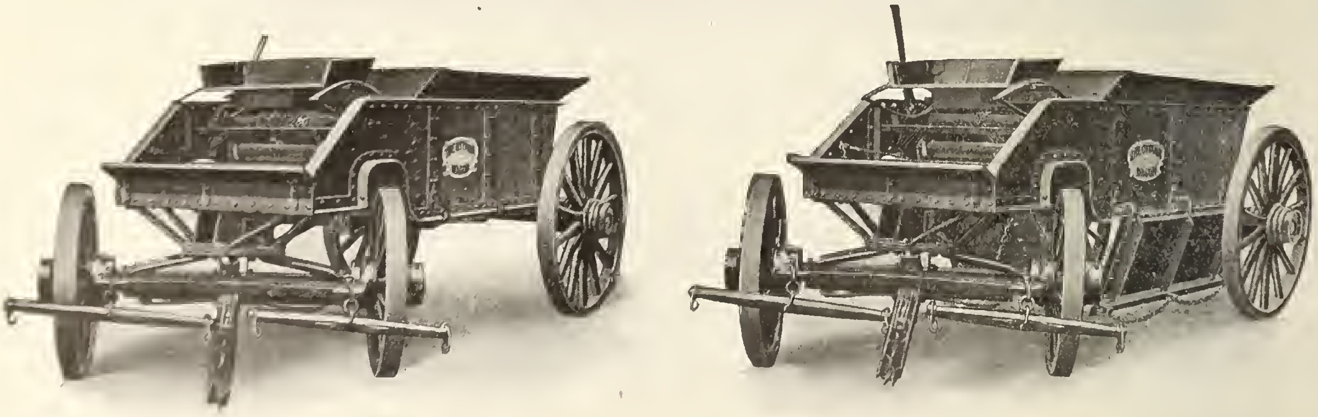

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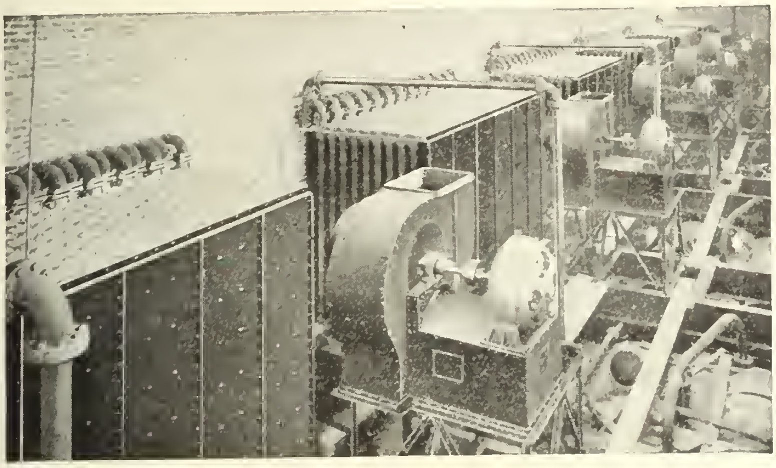

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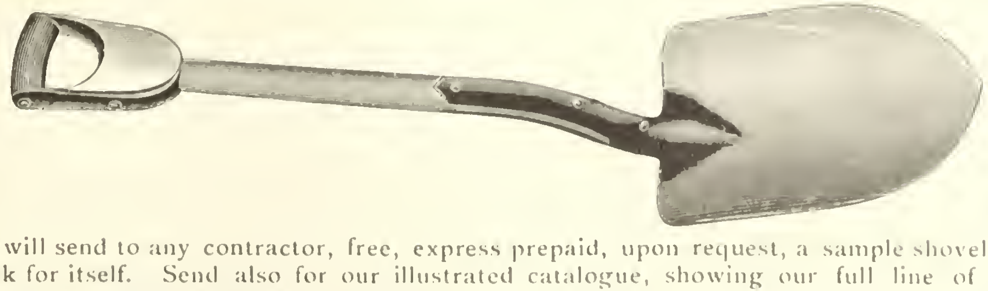

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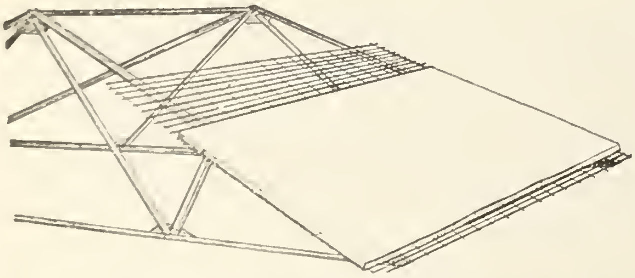

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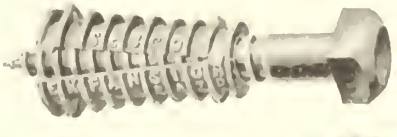

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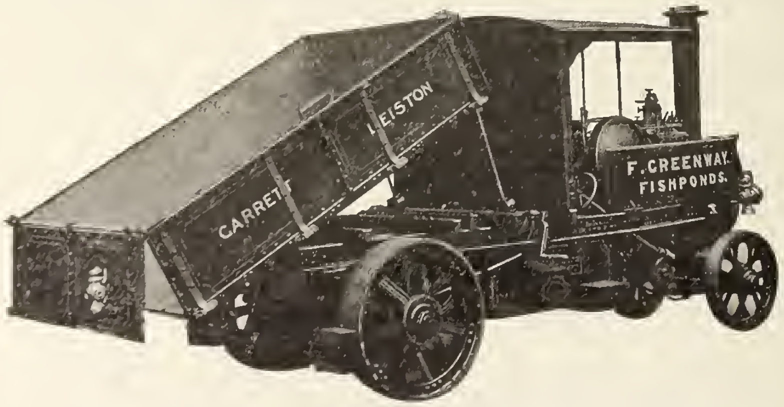

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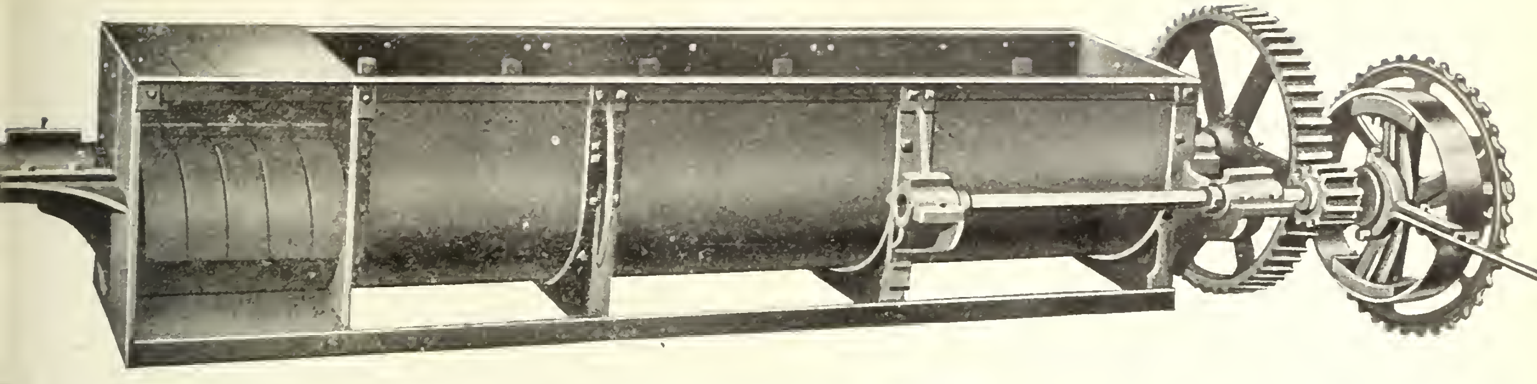

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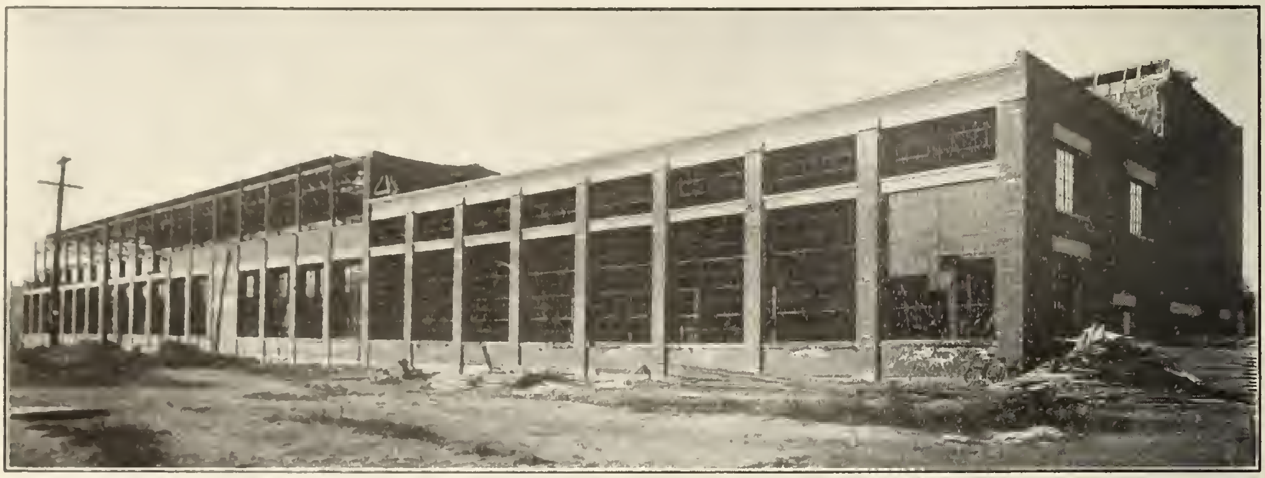

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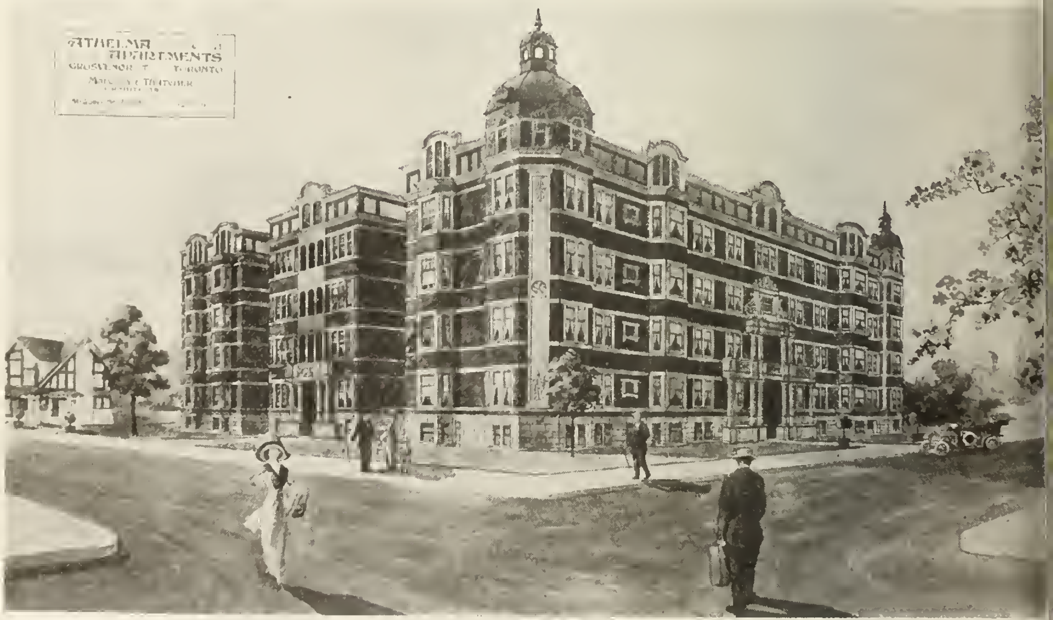

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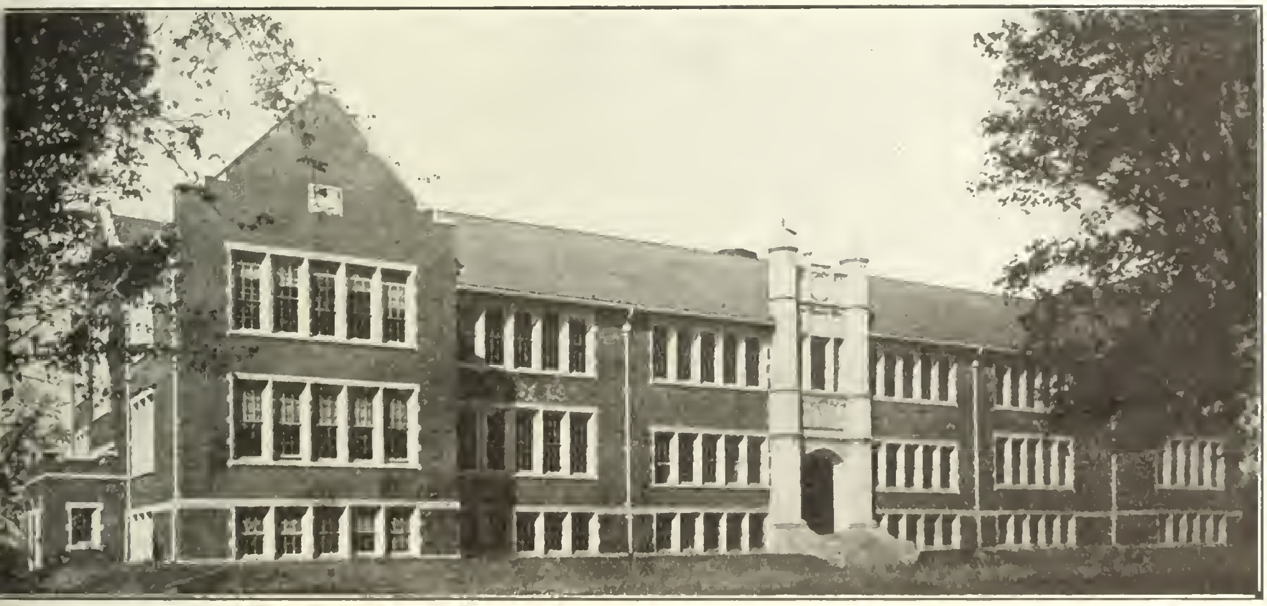

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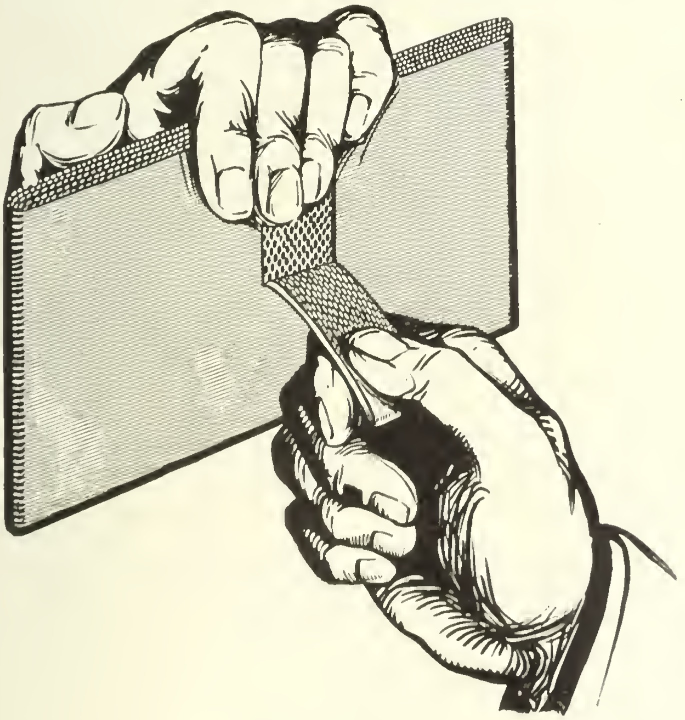

Look into the Belt for Yourself—Try to Tear it Apart.

Make a cut in the top layer—and then try to pull it apart. You will get a faint idea of its strength.

That is the result of forcing rubber at a tremendous pressure through the fine cotton fabric—separating every strand—thus abolishing all internal friction or grinding. Whilst these layers of fabric are afterwards so compressed as to be almost homogeneous, the finished belt bends easily, the "duck" being so woven as to retain complete pliability in the finished belt.

For Main Drives and High Speed Pulleys GOODYEAR Belting is the Best

It has all the tensile strength necessary to absorb tremendous strain without slip, stretch or rent. The grip of rubber and the prodigious strength of hard-twist cotton fabric are united, and prove equal to every emergency.

Where the power transmitted is high, and great tensile strength is essential, Goodyear Rubber Belting proves its worth.

EVERY GOODYEAR BELT IS SUBJECTED TO A STRINGENT TEST BEFORE LEAVING THE FACTORY, and what is more, the materials used in the manufacture are also tested in the Goodyear laboratory before using.

IF YOU USE A BELT AT ALL IT WILL PAY YOU TO USE A GOODYEAR

Loss of power is loss of profit—and an inferior belt is dropping power all the time. Goodyear belting quickly earns its cost in power saved and trouble avoided.

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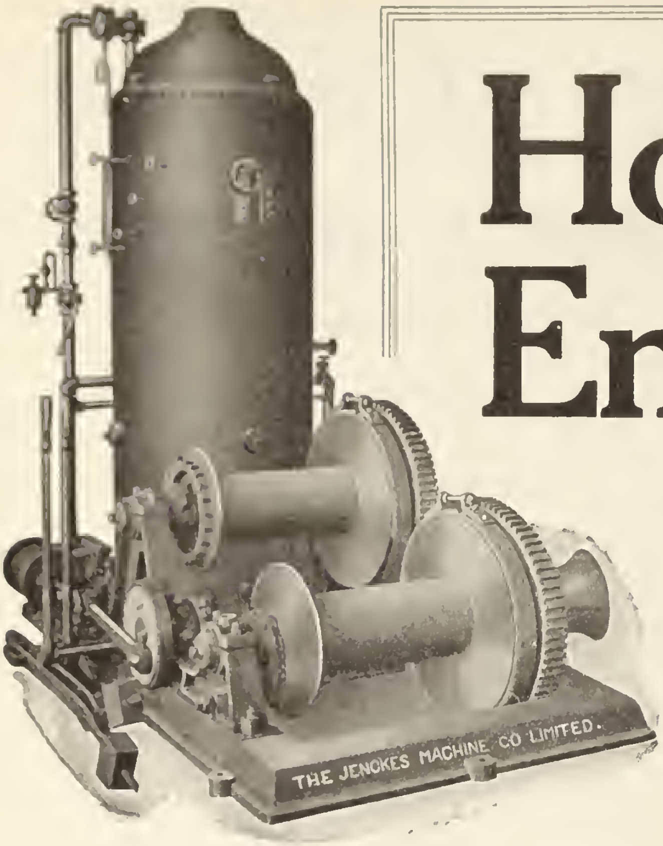
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**Steel Wardrobe Lockers
that are LOCKERS.
Standard and Special Sizes**

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Toronto Wire, Iron and Brass Works Co., Limited, Toronto, Canada

Concrete Made Permanently Waterproof with

Medusa Waterproofing

Fort Garry Hotel, Winnipeg
Architects, Ross & MacFarlane Contractors, Geo. A. Fuller Co., Ltd
30,000 lbs. "MEDUSA" Waterproofing used in this building

Montreal Harbor Commissioners, Elevator No. 2
John S. Metcalfe Co., Limited, Engineers and Contractors
20,000 lbs. "MEDUSA" Waterproofing used in this building

Medusa Waterproofing has now been on the market several years. It has been used in every part of the world under every condition and in every character of construction in which Portland Cement is used. It is specified by the most eminent Architects and Engineers in Canada, United States and Europe, and is rapidly displacing the old-time paints and so-called waterproof coatings formerly used to diminish the penetration of water into Concrete.

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A Word in Season Regarding this Issue

IN view of the special nature of the cover in which this issue is contained, the reader may regard as a platitude our editorial announcement that the number is devoted to brick and clay products. And yet such an introduction is necessary. An event of this character calls for a flourish on the editorial trumpet. Moreover, it would seem that a mark of deference should be paid to such a time-honored industry—whose annals are as old as those of mankind itself.

This number is comprehensive in its scope and we are confident that not one of our readers who takes the trouble to peruse it from cover to cover will do so without finding something of interest to the particular branch of the constructional field with which he may be identified. In cases, the editorial contributions are from men of international prominence in the fields of architecture and engineering and as such doubtless they will receive special attention, but it would be inexcusable on our part if we failed to direct attention to the informative matter presented by upwards of two hundred and fifty progressive advertisers in this issue. The experienced reader will require little advice as to the perusal of his trade journal, but unfortunately there are too few of us who can be classed as experienced readers. The average man fails to appreciate the co-ordination of theory and practice that is effected in a publication of this kind. It is this feature above all that we would emphasize in our foreword. And the occasion is opportune to tender our thanks to the contributor, the reader and the advertiser alike for their continued interest in the Contract Record.

The Christmas season is peculiarly appropriate for the presentation of a number devoted to brick and clay products, for of all materials these are the most human in their composition and consequently the most inviting in their appeal.

Doubtless the holiday will provide a little time for some quiet theorizing upon the principles expounded by Mr. Turner in his article on Fire Places and Inglenooks. We mention this article not with the idea of attaching particular prominence to it, but because there is an appropriate thought connected therewith. "What can be more pleasant on a cold winter's night, after a long day's work, than to sit beside a glowing fire and watch the crackling logs?" asks Mr. Turner. The sentiment appeals to us more strongly than the ideal of Omar Khayyam—undoubtedly the fireside is a better place to muse in than the wilderness—but we think that Mr. Turner's ideal needs the complement of "a book of verse," or a special number of this character.

The seasonable aspect, however, after all, is only visionary. It is hoped that the number will fulfil a more important function than that of providing Christmas reading and that it will be found to contain valuable information both as regards the technology of the various subjects entering into this important field and the actual development of the industry.

Experimental Work on Clays

THE Geological Survey of the Dominion have secured accommodation in the laboratories of the Mining Building at the University of Toronto for the purpose of carrying on experimental work on clays and shales. Mr. Joseph Keele, the geologist in charge of the clay investigation of Canada, who will have charge of this work, has brought with him about two tons of samples collected last summer in the provinces of Quebec, New Brunswick, and Alberta.

Mr. Keele has been working exclusively on clay and shale deposits for the last four years. His published reports constitute practically the only information available on these materials in this country.

The testing of clays will be done in the Department of Metallurgy, which is under the direction of Professor G. A. Guess. Part of the equipment for this work was installed by him, but the University authorities

CHRISTMAS AND THE NEW YEAR

"So this Xmastide,
We wish you Progress,
Growth, Happiness, Strength,
And a few tears for the other fellow
whose path is hard—
So that you may Not be Satiated
With your own Glad Laughter."

have given a further grant toward providing the apparatus necessary to make complete sets of physical tests on clays. A large pottery kiln, to be fired with oil, will be used for burning the commoner clay wares, made to full commercial size. Gas and electric furnaces will be used for testing refractory and other high grade clays.

Professor Guess has had a wide experience in the various metallurgical processes, and is familiar with the properties and uses of all refractory and semi-refractory clay wares so largely used in them. He has also provided facilities for experimenting in the extraction of aluminium and potash from clays and feldspar, the possibilities of which are attracting so much attention at present.

Mr. Keele has kindly offered to give instruction in methods of testing clays and the field investigation of clay deposits to a limited number of students.

The clay-working industry in the vicinity of Toronto, includes the manufacture of a fairly wide range of structural materials made from local clays and shales, so that students will have an opportunity of checking up their laboratory work with the results obtained in actual practice.

The Faculty of Applied Science have long been aware of the growing importance of the clay-working industry to Canada, and the need for wider technical knowledge of the raw materials and processes involved in it. Certain other needs of the University, however, have hitherto been regarded as more pressing, so that the technology of this important branch of the non-metallic minerals did not receive the recognition it deserved.

It is to be hoped that the start now made will lead eventually to the establishment of a course in Ceramics at the University of Toronto.

Reciprocal Demurrage

THE action of the Dominion Board of Railway Commissioners in granting the application of the railroads for permission to increase their demurrage charges has commended itself unfavorably to many interests identified with the constructional field. An argument put forward in many quarters is that the increased charges should at least be offset in a measure by reciprocal demurrage, under which the railroads would have to pay for any delay in delivery in exact proportion as the consignee would have to pay for delay in unloading. It is noteworthy that in the state of California, where increased demurrage charges have been accompanied by this reciprocal arrangement, things have worked smoothly for both the railroads and the shippers. It is urged by the railway companies that great loss and congestion have been brought about by the unnecessary detention of cars. This is true in part only, and in any case the contention is altogether out-balanced by the other side of the argument. Generally, the methods of handling freight traffic adopted by the railway companies have been most unsatisfactory. Freight cars, locomotives and terminals have all been inadequate. This inadequacy, combined in many cases with poor management, has resulted in great tardiness in the delivery of freight, with the result that shippers, whose payments are usually held up until the delivery of the goods, have lost heavily. The railroads, also, claim to have lost considerably, but the greater proportion of this loss is attributable to the bunching of the cars—and in any case the extent of the loss is a debatable point. The railroads claim that there is no money in it even with the rates now obtaining. We can only say that we would like to have the opportunity of investing in the business of owning freight cars under such conditions.

The application of the railway companies was disposed of too quickly. It was submitted to the Railway Commissioners at the psychological moment when it was most favorable to the railroads—when shippers all over the country were complaining of the shortage of cars.

The best course for shippers to take now is to exert every effort to secure reciprocal demurrage. If higher demurrage charges will remove any of the car shortage, reciprocal demurrage will end it altogether. The railroads may have had some cause for complaint, but these have always been outweighed by the troubles of the shipper.

Con-structive and De-structive Competition in the Brick Trade

THERE are two distinct and different kinds of competition: one is con-structive and the other is de-structive. One is consistent with all of those elements which tend to success, while the other savors of the characteristics which usually precede business disaster. One will build up the brick business until it is one of the greatest and most profitable pursuits upon the face of the earth, while the other will stunt its development and growth and cause it to yield but meagre earnings to those engaged in it.

Among men, among tribes, among nations, destructive competition with its annihilation, its desire to destroy, its greed for physical supremacy—such competition has written history.

Likewise among makers and sellers of brick there exists a destructive type of competition, with its annihilation, its desire to destroy, its insatible greed for supremacy at any cost; and the history of it has been written and is still being written in the financial lifeblood of more than a few brick concerns desperately struggling for existence. This sort of competition is not alone a relic of barbarism, but is characteristic of civilized nations, for civilization has inherited from savagery its ideas of competition. Every phase of the brick business involves the general subject of competition. Competition has for its foundation the law of supply and demand.

Taking up the constructive phase of competition let us begin with maintaining profitable prices. Honesty, just common honesty as between competitors would prove to be the most constructive force in the brick business—not alone the kind of honesty that fortifies a definite promise to meet a financial obligation; not the kind that permits insinuations to serve as statements, resting upon the virtue of not having actually spoken an untruth.

The only kind of honesty that will get us anywhere in a mutual effort for brick, is the kind that actually wishes well for our competitors:—a genuine, wholesome, frank, inspiring honesty that has the manhood of men back of it.

Destructive competition must give way to constructive. Unworthy motives must yield to worthy motives.

These things are necessary; they are all possible; they are inevitable when the right relation between competing brick men is established.

Clay Products—A Record of Production

Value Almost Doubled in Three Years—Consistent Development of Industry—Exports and Imports—Returns by Provinces*

By Jno. McLeish, Chief of the Division of Mineral Resources and Statistics

CANADA has now for some time been passing through what may well be termed a period of intensive development. A rapid growth of population, due to immigration, is being accompanied by a great wave of construction of all kinds—railways, highways, public works, commercial and private buildings, great and small. Nor is this growth of construction confined to works of necessity or utility. An increase in individual and collective wealth is demanding more and more the use of materials of the highest class, both as to substantial construction and beauty of architectural designs.

Of the various non-metallic materials used for construction, clay and stone are undoubtedly of first importance. Cement and lime, though equally necessary, may be considered as by-products of these. The record of production of these structural materials and clay products collected by the Department of Mines at Ottawa shows a production in 1911 valued at $22,709,611, as compared with a value of $19,627,592 produced in 1910; $16,533,349 produced in 1909 and $11,339,955 produced in 1908. These statistics must be used in a comparative rather than in an absolute sense for the reason that they include only a meagre record of the production of sand and gravel and a probably incomplete record of the production of stone.

Of the total production in 1911, the value of the output of clay products was $8,359,933, an increase of nearly 10 per cent. over the 1910 output; the production of cement was valued at $7,644,537, an increase of 19 per cent. over the previous year; stone was produced to a value of $4,328,757, an increase of over 18 per cent.; the value of the production of lime was $1,517,599, an increase of nearly 29 per cent. and sand lime brick was valued at $442,427, or an increase of over 15 per cent.

A record of the production of coal in the United States extending over many years shows a doubling in output during each ten years. The value of the production of clay products in Canada has almost doubled in three years.

While the increase in gross output was not as large as that shown in 1910, the clay manufacturing industry apparently made very satisfactory progress during the year. Demand in most districts exceeded supply and higher prices generally were realized. For the year 1911 about 419 active firms reported as against 438 active firms reporting for 1910. A larger number of men were, however, employed in 1911—an average of 9,131 being engaged, as compared with 8,656 in 1910, while the wages paid were $3,524,058 in 1911 as against $3,308,609 in 1910.

Considered by provinces, Ontario in 1911 had the largest output, being credited with 47 per cent. of the total value. Quebec was second, with 16 per cent., Alberta third, with 12½ per cent., Manitoba fourth, with 10 per cent., followed by British Columbia with 8 per cent.

In 1907 Ontario contributed 54 per cent. of the production of clay products, while the western provinces contributed only 21 per cent., as against 33 per cent. in 1911.

Of the total value of production in 1911, building and paving brick, including fireproofing, contributed $6,915,792 or nearly 84 per cent.; sewerpipe and tile production were valued at $1,152,528, or about 14 per cent. of the total. The total value of the production of pottery was reported as $439,264, of which $102,493 is estimated as being attributable to Canadian clays and the balance to imported clays, the value of production of building, paving and fireproofing brick shows an increase of nearly 12 per cent., while the production of sewerpipe and drain tile increased less than one per cent.

EXPORTS AND IMPORTS

The only export of clay products recorded is that of building brick, of which the exports in 1911 were 394,000, valued at $3,977, as compared with 390,000, valued at $2,762 in 1910, and 365,000, valued at $2,255 in 1909.

The imports of clay products and of clay, on the other hand, are quite considerable, and amounted in total value during the calendar year 1911 to $5,156,544, equivalent to about 62 per cent. of the domestic production. The total imports in 1910 were valued at $4,331,397, showing an increase in 1911 of $825,147, or 19 per cent., as against an increase in 1910 over 1909 of 33 per cent. In both years the imports have increased at a higher rate than the domestic production. Clay imports are classified by the Department of Customs under three main subdivisions, clays, brick and tile, and earthenware and chinaware. The imports of clays in 1911 were valued at $270,247, and included chiefly china clay and fireclay, with a small quantity of pipeclay, and other clays not classified. The value of chinaclay imports was $125,768, and of fireclay $125,

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*Specially contributed by kind permission of the Director of Mines.

PRODUCTION OF CLAY PRODUCTS BY PROVINCES 1906-1911

Province	1906	1907	1908	1909	1910	1911
	$	$	$	$	$	$
Nova Scotia	160,506	125,560	117,853	188,185	201,582	251,210
New Brunswick	19,220	57,377	75,513	65,570	56,175	58,000
Quebec	769,158	1,211,108	893,717	1,173,832	1,112,842	[illegible]
Ontario	3,136,870	3,123,372	2,176,152	3,125,811	3,667,810	[illegible]
Manitoba	517,065	166,132	265,091	559,008	781,601	841,128
Saskatchewan	136,022	125,159	87,566	115,516	160,850	226,958
Alberta	180,217	353,672	240,381	112,186	[illegible]	1,039,751
British Columbia	123,277	306,137	311,116	170,109	562,460	[illegible]
Totals	5,072,635	[illegible]	4,500,702	6,150,810	[illegible]	8,359,933

1909. The imports of these clays have varied considerably from year to year and do not show the same general increase as do the imports of manufactured clays. The imports classified under brick and tile were valued in 1911 at $2,369,761, of which about 34 per cent. was firebrick, other important items being building brick, sewerpipe and paving brick. There was also an importation under this class of manufactures of clay not specifically designated valued at $523,998. The imports of these "unclassified" brick and tile have increased steadily year by year, the value of such imports in 1905 having been only $20,804. The total imports of brick and tile in 1910 were valued at $1,755,773, showing an increase in 1911 of about 35 per cent. The imports of earthenware and chinaware, of which the most important class is tableware, were valued in 1911 at $2,516,536, as against $2,283,116, an increase of about 10 per cent.

Imported clay products are derived chiefly from Great Britain and the United States, although considerable quantities of earthenware, china and porcelain ware, white granite or ironstoneware, etc., are brought from Germany, France, Austria-Hungary, and Japan. Of the brick and tile imported in 1911, 76.7 per cent. was from the United States and 23.2 per cent. from Great Britain; and only $578 worth from other countries. Of the earthenware and chinaware 62 per cent. was imported from Great Britain; 15 per cent. from the United States; 9 per cent. from Germany; 7 per cent. from France, and considerable values also from Japan, Austria-Hungary, and other countries. The crude clays were imported principally from Great Britain and the United States.

COMPARISON OF IMPORTS WITH PRODUCTION

A comparison of statistics of imports of clay products with those of production is worth special attention. It will be noted in the first place that the total value of the imports in 1911 was at least $5,156,544 (certain items probably covering clay products not being included) showing a total approximate consumption of clay products valued at $13,416,537, of which only 62 per cent. was of domestic production.

In 1909 the approximate consumption was valued at $9,172,995, of which only 70 per cent. was of domestic production.

In the case of building brick, the imports, while increasing rapidly, are still small compared with the home production; it is different, however, with paving brick and firebrick. The imports of paving brick in 1911 were over twice, and the imports of firebrick nearly ten times the Canadian output.

While the production of sewerpipe and drain tile remained nearly stationary, the imports of these products more than doubled in 1911, and amounted in value to about one-third the domestic production.

In twelve years Canada has imported clay products to the value of over $30,000,000, and during the past two years the imports have increased at a greater rate than the domestic production. It should, of course, be remembered that a very large portion of the imports is of a class of product hitherto not available in Canada, such as china clay and chinaware. Nevertheless, there are evidently big opportunities for the development of our clay resources, and apparently, judging by the large number of companies being organized to construct and operate clay plants, these opportunities are being recognized. The recent development of kaolin deposits in the province of Quebec may also be followed by the establishment of industries for the manufacture of the higher grades of earthenware and chinaware.

CLAY BUILDING BRICK

In 1911 the total sales of clay building brick, including the common and pressed varieties, but excluding ornamental paving firebrick and fireproofing brick, were 732,901,056, valued at $6,515,472, made up of 634,550,517 common, valued at $5,420,890, or an average value per thousand of $8.37, and 87,350,539 pressed brick, valued at $1,094,582, or an average value per thousand of $12.53. In addition to the common and pressed brick, there was a production of ornamental brick of 605,643, valued at $11,281, and a production of fireproofing brick and architectural terra cotta, valued at $409,585.

In 1910 the production was 627,715,319 common brick, valued at $5,105,354, or an average value per thousand of $8.13, and 67,895,034 pressed brick, valued

PRODUCTION OF CLAY PRODUCTS BY PROVINCES, 1911

Province	No. of active firms reporting	No. of men employed	Wages	Common Brick No. manufactured	No. sold	Value sales	Per M.	Pressed Brick No. manufactured	No. Sold	Value Sales	Per M.
Nova Scotia	13	336	$ 97,513	22,300,000	22,680,000	$ 133,540	$5.88	850,000	850,000	$ 8,100	$9.52
New Brunswick...	6	126	24,091	4,811,470	4,300,000	36,800	5.55	100,000	100,000	1,200	12.00
Quebec..	60	1402	417,882	129,256,700	110,701,580	849,654	7.67	14,577,000	11,340,000	183,616	16.20
Ontario.	262	4366	1,727,478	335,221,526	318,670,621	2,513,965	7.89	51,990,204	50,333,750	514,081	10.21
Manitoba	18	1210	438,228	83,362,000	79,600,000	805,178	10.11	1,800,000	1,800,000	21,750	12.08
Saskatchewan .. .	13	303	105,507	17,824,260	16,819,960	159,634	9.49	4,726,700	4,251,700	65,124	15.31
Alberta.	28	782	324,868	58,064,710	56,943,955	574,243	10.10	14,752,734	14,828,975	204,758	13.81
British Columbia..	19	606	388,491	37,816,308	35,834,401	347,876	9.70	5,373,647	3,846,114	95,953	24.94
	419	9131	3,524,658	688,656,974	645,550,517	5,420,890	8.37	94,170,285	87,350,539	1,094 582	12.53

Province	Paving Brick No. Sold	Value $	Ornamental No. Sold	Value $	Firebrick and Fireclay Shapes Value	Fireproofing and Arch. Terra Cotta, etc. Value $	Pottery Value $	Sewerpipe Value $	Tiles drain Value $	Total Value Clay Products $
Nova Scotia ..	....	....	....	....	15 207	11,256	1,800	98,946	5,400	274,249
New Brunswick.	....	....	....	....	....	....	....	....	....	38,000
Quebec	....	....	192,000	3,840	18,000	76,199	59,400	150,303	455	1,341,467
Ontario	5,220,400	79,444	413,643	7,441	....	51,080	41,293	409,242	300,029	3,916,575
Manitoba..	....	....	....	....	....	....	....	....	7,500	834,428
Saskatchewan ..	....	....	....	....	2,200	....	....	....	....	226,958
Alberta	....	....	....	....	....	270,750	....	....	3,000	1,052,751
British Columbia	....	....	....	....	53,723	300	....	154,225	23,428	675,505
Totals . .	5,220,400	79,444	605,643	11,281	89,130	409,585	102,493	812,716	339,812	8,359,933

IMPORTS OF CLAY PRODUCTS, 1905 TO 1911

Imports	12 months ending June, 1905	12 months ending June, 1906	12 months ending March, 1907	12 months ending March, 1908	12 months ending March, 1909	Calendar Year 1909	Calendar Year 1910	Calendar Year 1911
Brick and tile:—	$	$	$	$	$	$	$	$
Bath brick	916	1,466	1,076	1,834	4,432	1,495	2,290	2,623
Building brick	168,122	194,897	88,144	139,105	108,773	195,360	274,482	475,865
Paving brick	32,578	46,008	23,256	61,346	101,187	139,366	124,994	164,292
Firebrick, of a class or kind not made in Canada	*436,941	*591,854	*506, 801	639,347	350,457	485,994	811,927	814,414
Drain tile, not glazed	1,229	4,727	12,106	2,080	2,394	2,785	4,485	5,640
Drain pipe, sewerpipe, and earthenware fittings therefor, chimney linings or vents, chimney tops and inverted blocks, glazed or unglazed.	101,166	131,353	93,458	125,747	106,399	170,280	175,599	382,929
Manufactures of clay, N. O. P.	20,804	30,067	45,845	110,097	141,391	524,170	361,996	523,998
Total	761,756	1,000,372	770,686	1,079,556	815,033	1,249,450	1,755,773	2,369,761
Earthenware and chinaware:—								
Brown or colored earthenware and stoneware and Rockingham ware.	15,464	8,363	9,625	22,847	28,273	36,673	53,413	52,100
C. C. or cream colored ware, decorated, printed or sponged and all earthenware, N. O. P.	169,102	191,552	154,879	239,513	197,623	219,936	202,475	184,291
Demijohns, churns or crocks	8,158	10,508	9,342	17,836	10,571	8,888	6,607	4,933
Tableware of china, porcelain, white granite or ironstoneware	1,033,171	1,004,024	902,798	1,555,517	1,202,537	1,212,365	1,545,538	1,718,582
China and porcelain ware, N. O. P.	199,960	214,013	134,675	109,446	87,798	87,467	95,509	62,025
Tiles or blocks of earthenware or stone prepared for mosaic flooring	....	....	62,547	45,836	43,299	56,974	90,524	123,203
Earthenware tiles, N. O. P.	65,181	78,247	67,027	116,480	79,854	81,393	125,772	154,351
Manufacture of earthenware, N.O.P.	71,609	117,824	81,987	83,309	66,932	78,063	163,278	217,051
Total	1,562,645	1,624,531	1,422,880	2,190,784	1,716,887	1,781,759	2.283,116	2,516,536
Clays:—								
China-clay, ground or unground ...	94,501	65,909	78,772	97,236	90,922	100,066	142,125	125,768
Fireclay, ground or unground	73,837	131,130	85,044	155,873	77,146	86,161	124,293	125,199
Pipeclay, ground or unground	1,189	1,333	307	319	887	310	114	1,786
Clays, all other, N. O. P.	7,278	22,132	14,117	14.292	21.280	29,793	25,976	17,494
Total	176,805	220,504	178,240	267,720	190,235	216,330	292,508	270,247
Grand total	2,501,206	2,845,407	2,371,806	3.538,060	2,722,155	3,247,539	4,331,397	5,156,544
Baths, bath-tubs, basins, closets, lavatories, urinals, sinks and laundry tubs of any material	73,569	67,828	62,547	234,505	157,881	211,837	262,667	285,847
Chalk, china or cornwall stone, cliff stone, and feldspar, fluorspar, magnesite, ground or unground	5.276	9,053	7,376	72,467	81,675	96,747	121,959	147,646

*Includes stove linings, N. E. S.

at $807,294, or an average value per thousand of $11.89, the total of the two classes being 695,610,353, valued at $5,912,648. The production of ornamental brick in 1910 was 703,345, valued at $16,092, and of fireproofing and architectural terra cotta, $176,979.

The increase in production of fireproofing has been particularly marked and is due to the establishment of new plants, including the National Fire Proofing Company of Canada at Hamilton, Ont., and the Alberta Clay Products Company, Limited, of Medicine Hat, Alberta.

The demand for brick has been very strong, particularly throughout the west, where numbers of plants are being increased in capacity and many new plants either contemplated or in course of construction.

The exports of building brick have never been large, averaging for a number of years past about $6,000 in value per annum, but falling in 1910 and 1911 to $2,762 and $3,977 respectively. The annual imports for a number of years previous to 1903 averaged only about $20,000 in value; during the past eight years, however, the imports have rapidly increased from $100,000 to nearly $500,000 per annum. During the calendar year 1911 the imports were 51,102,000 brick, valued at $475,865, of which 6,404,000, valued at $72,675, or an average of $11.35 per thousand, were imported from Great Britain, and 44,698,000, valued at $403,190, or an average of $9.02 per thousand, from the United States. The imports during the calendar year 1910 were 29,049,000 brick, valued at $274,482, of which 1,993,000, valued at $26,447, or an average of $13.27 per thousand, were imported from Great Britain, and 27,056,000, valued at $248,035, or an average of $9.45 per thousand, from the United States.

Nova Scotia and New Brunswick.—An increase is shown in the brick production of both these provinces in 1911, the total production in Nova Scotia being 23,530,000, valued at $141,640, and in New Brunswick 4,400,000, valued at $38,000. In addition to brick there was a production in Nova Scotia of fireproofing, terra cotta, tile, etc., valued at $11,256, and a production of pottery valued at $1,800. The principal brick plants are located at Pugwash, Elmsdale, New Glasgow, Middleton and Annapolis in Nova Scotia, and at Fredericton, St. John and Chatham, New Brunswick.

Quebec.—The total production of brick in Quebec in 1911 is reported by 60 operative firms as 122,041,000, valued at $1,033,270, comprising 110,702,000 common brick, valued at $849,654, or $7.67 per thousand, and 11,340,000 pressed brick, valued at $183,616, or $16.20 per thousand. The production by 62 active firms in 1910 was 130,287,000 brick, valued at $929,492.

The production of brick is widely scattered throughout the province, but the principal brickmaking plants are located at Laprairie, Sherbrooke and St. Jean Deschaillons.

Ontario.—This province has for a number of years produced over 50 per cent. of the clay building brick production in Canada, though the percentage in 1910 and 1911 has fallen to a little over 40. The city of Toronto and vicinity, including the counties of York and Halton, is the principal brickmaking section, and in 1911 produced about 59 per cent. of the Ontario production, or about 28 per cent. of the total Canadian production of brick.

The district next in importance is the County of Wentworth, comprising the city of Hamilton and vicinity, producing over 7½ per cent. of the Ontario production. The Ottawa district, including the counties of Russell and Carleton, produced over 6½ per cent. Other important districts are Algoma and Nipissing, which cover a wide area, and the counties of Waterloo, Middlesex, Grey, Simcoe, Essex and Kent. These thirteen counties contributed over 80 per cent. of the Ontario production. The greater part of the pressed brick reported as such was made in the Toronto and Hamilton districts.

In addition to the ordinary building brick there was produced in this province in 1911, ornamental brick valued at $7,441, and fireproofing and terra cotta valued at $51,080.

Manitoba.—The production of building brick in Manitoba in 1911 was 81,400 thousand, valued at $826,928, comprising 79,600,000 common brick, valued at $805,178, or an average of $10.11 per thousand, and 1,800 thousand pressed brick, valued at $21,750, or $12.08 per thousand. The total production in 1910 was 75,835 thousand, valued at $746,704, showing an increase of over ten per cent. in the value of the production.

The principal brickmaking plants are located at Winnipeg, Morris, Lac du Bonnet, Portage la Prairie, Sydney, Brandon, Brookdale, Gilbert Plains and Virden.

Saskatchewan.—Returns from 13 operating firms show a production in 1911 of 21,072 thousand brick valued at $224,758 as compared with 14,733 thousand brick valued at $160,850 produced by 11 firms during 1910.

The principal clay plants are located at Estevan, Prince Albert, Saskatoon, Rosthern, Verigin and Yorkton.

Alberta.—The production in 1911 reported by 28 firms was 71,773 thousand valued at $779,001 as against 73,640 thousand valued at $750,982 reported by 29 firms in 1910. The 1911 production included 56,944 thousand common brick valued at $574,243 or an average of $10.10 per thousand and 14,829 thousand pressed brick valued at $204,758 or an average of $13.81 per thousand.

In addition to building brick there was a production in this province during 1911 of fireproofing valued at $270,750.

The principal centres of production are Edmonton, Cochrane, Calgary, Medicine Hat, Lethbridge and Red Deer.

Throughout the three prairie provinces the demand for brick was particularly heavy and the prices of common ranged from $8 to $12 per thousand while pressed brick sold at from $14 to $20 per thousand.

British Columbia.—The production during 1911 by 19 active firms was 39,681 thousand brick valued at $443,829 and included 35,835 thousand common brick valued at $347,876 or an average of $9.70 per thousand and 3,846 thousand pressed brick valued at $95,953 or an average of $24.94 per thousand. The total production by the same number of firms in 1910 was 36,316 thousand brick valued at $394,473. Vancouver, New Westminster, Port Haney and vicinity, Anvil Island, Victoria and Sydney are the principal centres for the production of common brick while pressed brick are made in considerable quantities at Clayburn and Anvil Island.

Paving Brick.—The total production of paving brick and paving blocks in Canada in 1911 was reported as 5,220,400 valued at $79,444, as compared with a production of 4,215,000 valued at $78,980 in 1910.

This paving brick is made at West Toronto, Ontario, from shale obtained from the banks of the Humber river. The annual production has for a number of years varied from 3,000,000 to over 5,000,000 per season and the output finds a market chiefly in Toronto.

The imports of paving brick have during the past three years exceeded the domestic production. During the calendar year 1911 the imports were 11,450 thousand valued at $164,292 or $14.34 per thousand and included 4,988 thousand valued at $78,201 or $15.68 per thousand from the United States and 6,462 thousand valued at $86,091 or $13.32 per thousand from Great Britain. The imports during the calendar year 1910 were 10,503 thousand valued at $124,994.

Fireclay and Fireclay Products.—There are a number of clays from different localities that have been used in the manufacture of refractory brick or firebrick, and for furnace linings, etc., which have been usually termed fireclays. These include clays found with the coal measures at Westville, Nova Scotia, and at Comox, Vancouver Island; also clays found south of Moose Jaw, Saskatchewan, and at Clayburn, near the city of Vancouver, British Columbia. Stove lining and other refractory clay products are made at several places in Ontario and Quebec from imported fireclays.

The total value of the sales of fireclay, firebrick and fireclay products in 1911 was $89,130 as compared with a valuation of $50,215 in 1910 and $78,132 in 1909.

The production in 1911 comprised 2,367,937 firebrick, valued at $44,122 or an average of $18.63 per thousand; fireclay or refractory clay sold was 7,532 tons valued at $24,128 and other fireclay products valued at $20,880.

The imports of firebrick during the calendar year 1911 were valued at $814,414 of which $659,602 worth were imported from the United States and $154,020 from Great Britain. The imports of firebrick in 1910 were valued at $811,927 and included $734,908 from the United States and $76,902 from Great Britain. Fireclay was imported during the calendar year 1911 to the value of $125,199 as compared with a value of $124,293 in 1910 and $86,161 in 1909.

Sewerpipe and Drain Tile.—The total value of the sales of sewerpipe in 1911 was $812,716 as compared with a value of $774,110 in 1910 and a value of $645,722 in 1909. Nearly 50 per cent. of the production in 1911 was made in Ontario.

The imports of drain pipe and sewerpipe during the calendar year 1911 were valued at $382,929 of which $338,644 worth were imported from the United States; $44,278 from Great Britain and $7 from other countries.

The production of drain tile as reported to the Mines Branch was not as large in 1911 as in 1910 or 1909. The total sales in 1911 were valued at $339,812 as against $370,008 in 1910 and $408,440 in 1909.

The Ontario Bureau of Mines reports the total number made in that province during 1911 as 21,461,000 valued at $343,956 or an average of $16.03 per thousand as compared with 21,028,000 valued at $318,456 or an average of $15.14 per thousand in 1910. The sales in Ontario in 1911 as reported to this branch were valued at $300,029 as against a value of $334,402 in 1910.

The imports of unglazed tile are comparatively small, the value during the calendar year 1911 being only $5,640 as compared with $4,485 in 1910 and $2,785 in 1909.

Fireplaces, Ingle Nooks and Chimneys

Their Proper Construction and Treatment—Essential Details in Design —Use of Flue Linings—Interesting Features of Chimney Stacks

By Philp J. Turner, F.R.I.B.A., Montreal

THE fireplace in a house claims and receives credit for combining in the highest degree the attributes of ornamentation and utility. This being the case, it is of the utmost importance that such features in a building be properly constructed. It is not so long ago that fireplaces were considered unusual and a luxury in a house in this country, but now no modern house is regarded as complete without one or more.

A good deal of our sentiment about home centres in the fireplace, and what can be more peaceful or pleasant on a cold winter's night after a long day's work than to sit beside a glowing fire and watch the crackling logs.

However, many mistakes are made in the planning of the fireplace openings, the sizes of the ingle nooks and formation of the flues, which are not easily rectified but which can be avoided beforehand if proper attention is given to such details. An architect's reputation soon suffers if his chimneys will not draw and the fireplaces belch forth smoke into the room, and so it becomes important that the subject should be fully understood by him.

A fireplace that is constructed properly should have the two essential qualities: (1) Of throwing out into the room a maximum amount of heat for the fuel that is consumed; (2) Of not smoking. To accomplish both of these objects requires very careful attention to details of form and construction.

Jambs that are splayed reflect more heat into a room than a fireplace where the jambs are set at right angles to the back. (Where the jambs are made to slope they should be bevelled about 3 in. to the foot.) The construction of the throat and flue is responsible for most of the trouble in a fireplace.

No good will be obtained in altering the shape of the fireplace opening, if the flue is wrong from the start, so this necessarily becomes one of the matters to receive first attention. The area of the flue must bear some comparison with the fireplace opening. The area of the former is usually made one-tenth to one-twelfth of the area of the latter. If the flue for instance is 9 in. x 9 in., which gives an area of 81 inches, it can be said that the flue will satisfactorily accommodate a fireplace opening of 972 inches. A good proportion for a fireplace opening is one in which the height is about two-thirds of the width, and in the above case the size suited to the flue would be one having a height of 27 inches and a width of 36 inches—a larger opening for such a flue should not be attempted.

The throat as shown in Figure No. 1 should be made long and narrow and arranged to contract gradually to the centre until it is of the same width as the flue in the centre.

The flue starting at the throat, should be gradually contracted to its normal size directly over the middle of the fireplace opening. Should it be necessary it may be deflected to one side or the other. Such slopes do not impair the drawing power of the flue, provided the angle is not less than 45 degrees, on the contrary the draught is oftentimes improved. Where the slope of a flue is made less than 45 degrees with the horizon, a soot door for cleaning purposes should be built in the chimney at the commencement of the angle.

When constructing the throat to a fireplace the principle advanced is that the shelf in the lower part of the throat has the tendency to deflect the downward currents, should there be any, starting them upwards.

The area of the throat theoretically should be of the same area as the flue (if no damper is used) and bear the same proportion to the size of the opening itself as the flue. In taking for example a fireplace

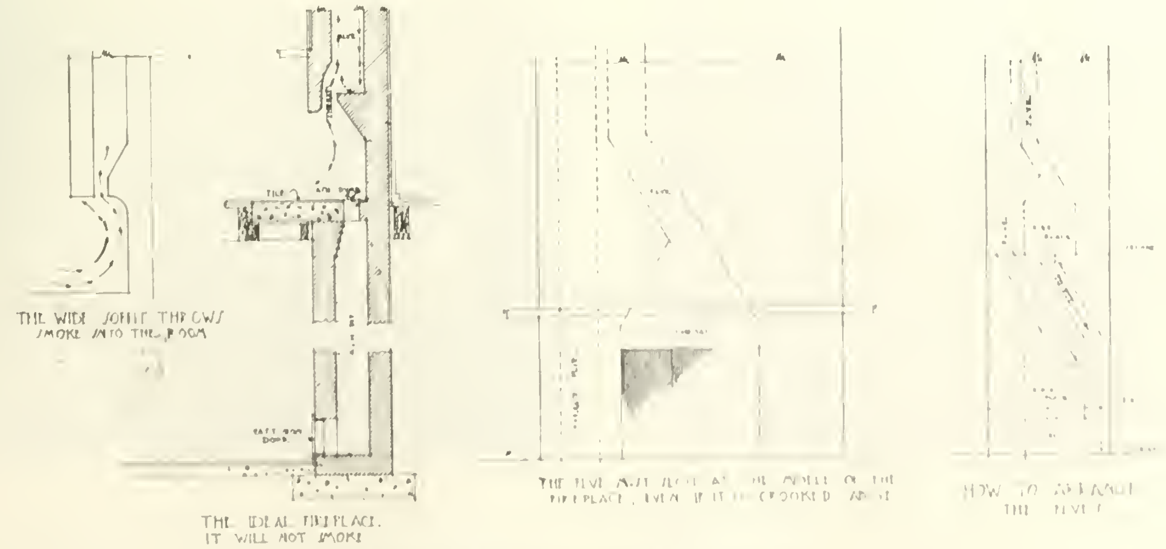

THE WIDE SOFFIT THROWS SMOKE INTO THE ROOM
THE IDEAL FIREPLACE. IT WILL NOT SMOKE
THE FLUE MUST START AT THE MIDDLE OF THE FIREPLACE, EVEN IF IT IS CROOKED ABOVE
HOW TO ARRANGE THE FLUES

Fig. 1—Constructional details of fireplace

opening 4 ft. 0 in. wide by 2 ft. 6 in. high, and considering the area of the flue and throat to be one-tenth of the opening, we shall have for the latter:

$$\frac{\text{Area of opening}}{10} = \frac{1440}{10} = 144 \text{ square inches,}$$

which gives one a flue 12 in. x 12 in. and a throat 48 in. x 3 in.

The throat should always extend across the full width of the opening and be as near the front as possible.

Dampers are excellent to regulate width of throat and draught, but they should open the full length of throat. In large and high fireplaces frequently counterbalanced "Blowers" or "aprons" of iron or copper (usually treated ornamentally) are hung to slide up or down just back of the facing or at front of throat.

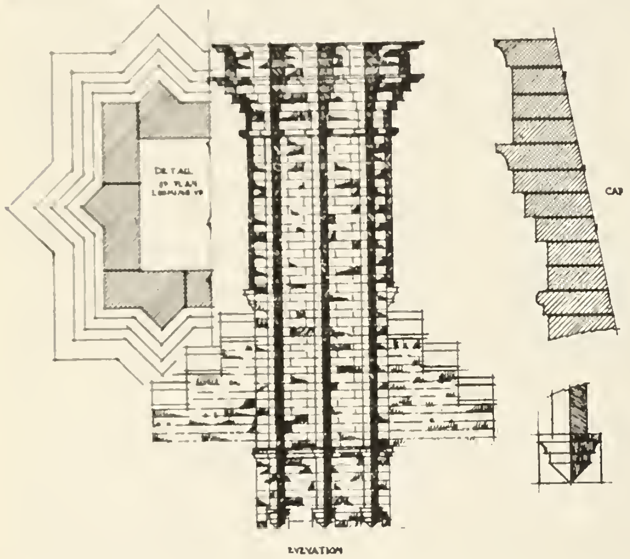


Fig. 2—Example of ornamental chimney stack, witth details

The back of the fireplace as shown should slope towards the throat. Ordinary fireplaces are made usually from 2 ft. 6 in. to 4 ft. 0 in. wide, 16 in. to 22 in. deep and about 2 ft. 6 in. high, though many are made larger and coal grates are often made much smaller.

A fireplace opening where wood is to be burnt should never be less than 18 in. and 14 in. for a coal grate.

All fireplaces should be lined with firebrick. It is customary to build rough openings 6 in. or 8 in. wider than the finish and afterwards to complete these openings to the size required with firebrick which can be obtained in a great variety of sizes,—one of the favorite used being that known as the small "Scotch" brick 2 in. thick. Where only gas stoves are used, the opening need only be lined with glazed tiles.

In England it is quite customary to build the flues of brick and to plaster them inside with a mixture of cow-dung and lime-mortar, which is called "pargetting." Where this is done the flues should have a thickness of at least one brick (8 in.) round them on the outside and 4 in. withes between them.

Terra cotta flue linings, however, are commonly used in this country, and when these are employed 4 in. of brick on the outside is considered sufficient.

They can be set in groups with only occasional "withes" to tie and strengthen the chimney—although it provides better work when a 4 in. withe between each flue is insisted upon. These terra cotta linings have the advantage also of giving clean smooth flues of uniform size throughout. The saving of brick and labor, and also of space in the chimney, compensates for the slightly extra cost of such linings.

Where flue linings are used the tiles should be carried about 2 in. above the chimney cap so that the water will not wash off the top of the chimney into the flue.

Fireplaces and chimneys placed on the inside wall of buildings are supposed to give better results than those placed on the outside. In the latter case there should be always built a 2 in. hollow space in the thickness of the wall behind the fireplace opening for its whole width. This precaution is taken so that the back of the fireplace may not be chilled too much in the winter or cause the fire to smoke or the flue to draw badly or tardily. Where this hollow space is not provided moreover, the heat from the bricks at the back of the flue is liable to crack the bricks on the outside.

Each fireplace of course should have a separate flue, (though the kitchen range may be connected with the furnace-flue without bad results.) For the average small fireplace opening 9 in. flues are used, and for the house furnace a 12 in. flue is usually found sufficient.

Fig. 3—A dining room ingle nook in an Old Country house, fitted with a "well-fire." The width of the recess is 11 ft. 6 in. The space now occupied by the ingle was formerly taken up by a large bricked-in kitchen range and boilers. The old kitchen, 300 years old, was converted into a dining room. (Philip J. Turner, Architect.)

Fig. 4—An ingle nook in a billiard room. The floor of the recess is raised above the floor of the room to facilitate a view of the game. The ceiling is kept down so that ventilating flue from the room may be obtained and connected with the chimney (Philip J. Turner, Architect)

In modern houses it is customary to fit in the hearth of the fireplace a dump for ashes covered with a hinged iron cover. The ash flues to these openings are made smaller than the ordinary smoke flues one 8 in. x 4 in. or 6 in. circular being sufficiently large for the purpose. Where a fireplace is constructed immediately over one below, the same ash flue can be utilized for both hearths. These flues lead to an ash pit in the basement where the ashes can be removed as they accumulate.

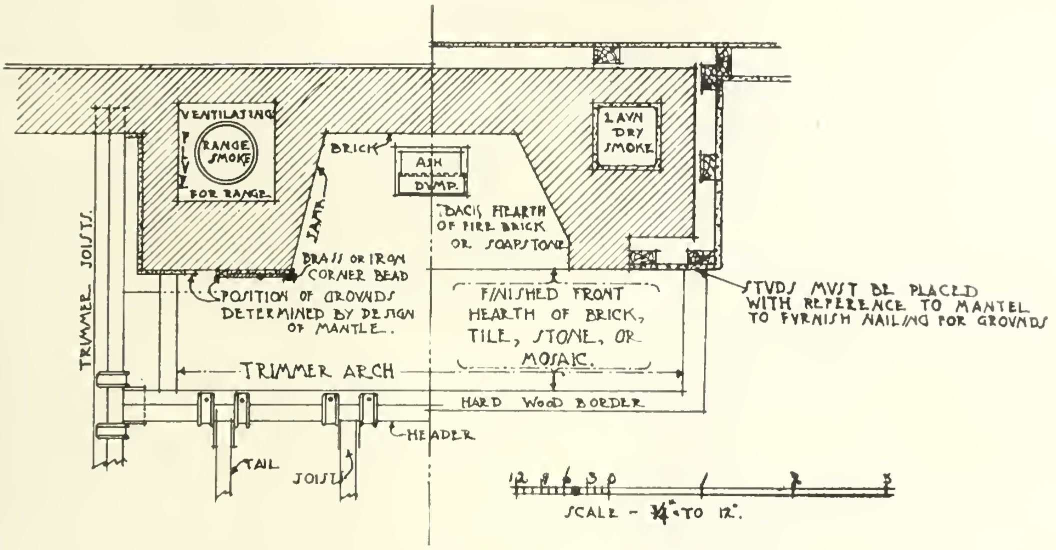

VENTILATING FLUE FOR RANGE
RANGE SMOKE
BRICK
JAMB
ASH DUMP.
BACK HEARTH OF FIRE BRICK OR SOAPSTONE
LAUN DRY SMOKE
BRASS OR IRON CORNER BEAD
POSITION OF GROUNDS DETERMINED BY DESIGN OF MANTLE.
FINISHED FRONT HEARTH OF BRICK, TILE, STONE, OR MOSAIC.
STUDS MUST BE PLACED WITH REFERENCE TO MANTEL TO FURNISH NAILING FOR GROUNDS
TRIMMER JOISTS.
TRIMMER ARCH
HARD WOOD BORDER
HEADER
TAIL
JOIST
12 9 6 3 0 1 2 3
SCALE - ¼" TO 12".

Fig. 5—Plan of fireplace, showing ventilating flue

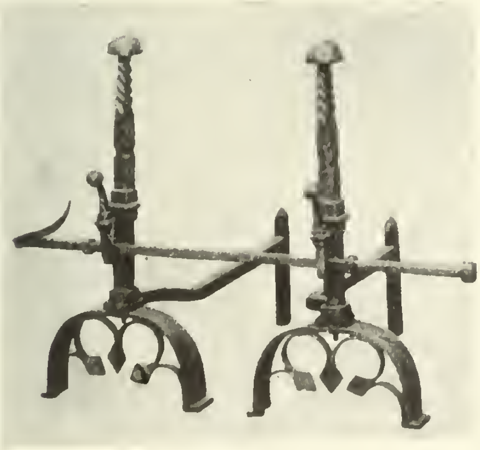


Fig. 6—Brush steel andirons, of an English type

Ventilating Flues.—Flues are sometimes formed in a chimney stack for the purpose of carrying off the foul air from a room. Unless some mechanical apparatus is used, these will not be found to be very effective unless draught is caused by heating the flue. Consequently if such ventilation is desired the flue should be warmed by heating it inside with a small gas burner or placing it in close touch with the fireplace flue; perhaps one of the most effective ways is that shown by sketch, Fig. 5, where the flue for the kitchen range is placed inside a larger one, the outer space forming the ventilating space.

Galvanized Iron Smoke Flue.—Where this material is employed, the metal should be at least No. 20 guage and No. 16 for boiler flues. Galvanized iron flues, however, cannot be considered satisfactory as the pipes are liable to be eaten away by rust or acids within ten or twelve years.

Height of Chimneys.—Flues will smoke and draw badly more often on account of the insufficient height of the chimney than from any other cause. A chimney should always extend a little above the highest point of a building or of buildings adjacent to it, as otherwise eddies formed by the wind may cause downward draughts in the flues making them smoke. Where it is quite impracticable to carry a chimney above the highest point of a roof, it should be topped out with a hood, open on two sides, the sides parallel to the roof being closed. Many of the present day house designs would have been much improved had the chimneys been carried up higher and not made to look so insignificant. One might think from the way they are cut down in size and almost hidden that architects were afraid of them even being seen, and yet if we study the many charming examples of old houses in

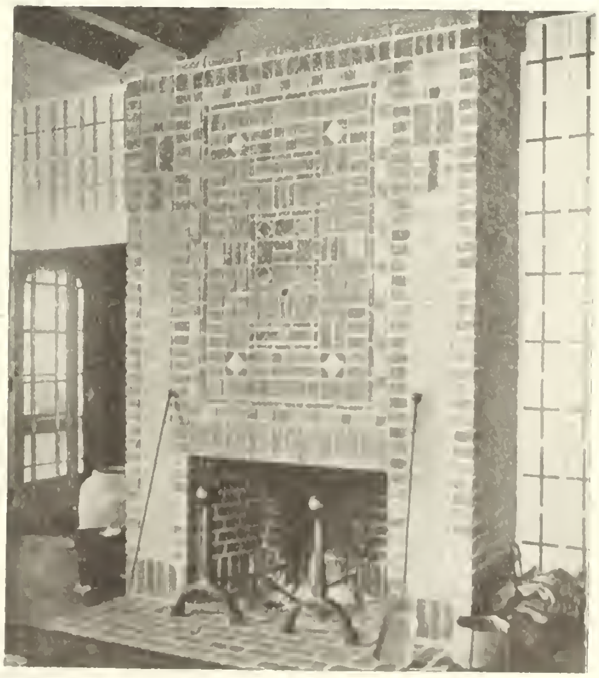


Fig. 7—A fireplace in tapestry brick. Built of various shades of brownish grey, deep rich red or golden buff. The borders of the pilasters are of a darker color than the centre and the central mosaic panel, with its lace work of mortar joints is beautifully enriched wih blue and deep brown.

England, we shall notice that the chimney stacks are often made the principal feature of the exterior, being designed boldly, often times elaborately, and carried up many feet above the ridge. Such a treatment at once gives satisfaction to the eye and speaks of comfort within. One feels also that here at least no attempt has been made to economize by saving a few courses of bricks as its modern prototype often seems to suggest, whether intended or otherwise.

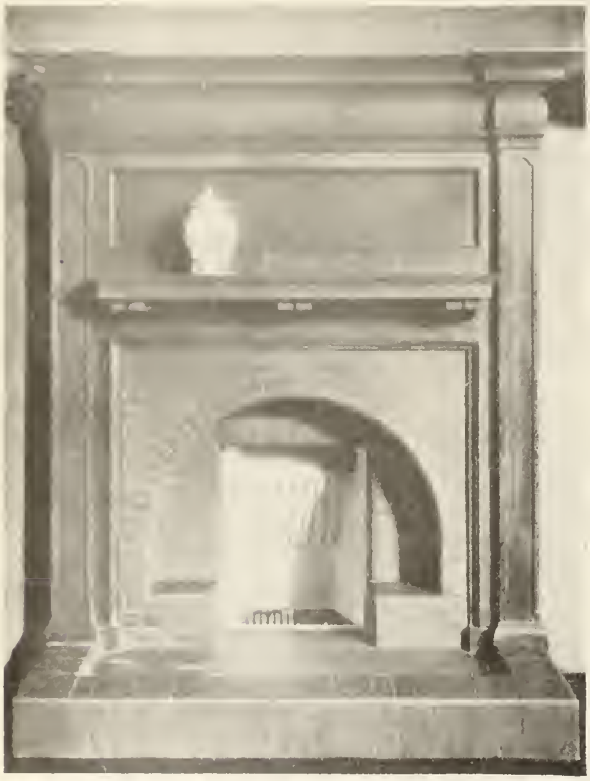


Fig. 8—A typical "well-fire" interior

The Finished Fireplace.—The larger number of fireplaces at the present time are built with firebrick linings and tile facings and hearths with wooden mantels. There are a great many styles of grates that may be used in fireplaces, the "club-house" grate is probably more frequently used in localities where soft coal is burned.

This consists of a cast iron grate supported by four legs and with an ornamental front about 6 inches high. It has no back or sides, and should fit close to the firebrick lining. There is also a movable front to close the opening beneath the grate.

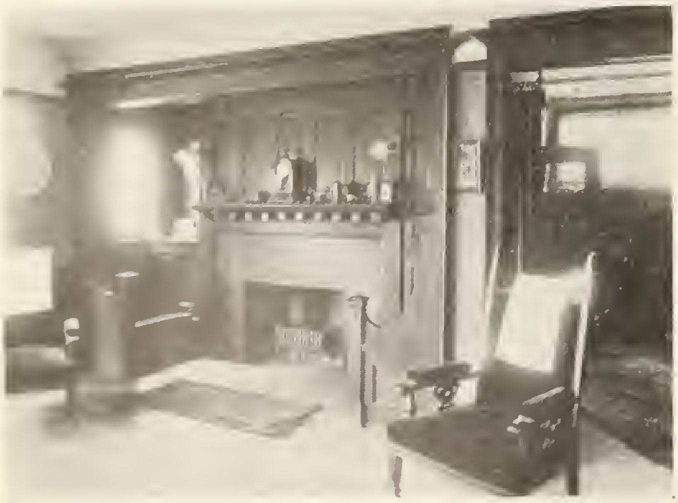


Fig. 9—An ingle nook in a house at Outremont, P.Q. (Philip J. Turner, Architect.)

Fireplaces in which wood is to be burned may have openings up to 4 ft. 0 in. wide, 3 feet openings being quite common. Wood is generally burned on andirons (see Fig. 6).

For burning hard coal, especially in ornamental fireplaces, basket grates, having open fronts and solid backs and ends are often used.

Brick and terra cotta mantels in connection with wood mantels have been much used, but the combination whether from a practical or decorative standpoint is one not to be recommended. It is far better, when brick and terra cotta are used to form the entire mantel of these materials.

The great drawback in the past to forming mantels of sufficient merit of these materials has been the difficulty of obtaining bricks of suitable color and accuracy, but this objection has now been overcome, and some very charming effects can be obtained by using "Tapestry" and similar bricks (See Fig. 7).

Some of the very best results have been procured from an open fire by fitting the fireplaces with the "Well-Fire" or other special form of firebrick (see Fig. 8).

The coals are placed directly on the hearth, and in this way a greater heat is thrown into the room than when any other fireplace is used.

While it is very important that all fireplace hearths should be properly constructed and all woodwork kept clear of flues and fireplaces, it is especially important where such a form as the Well-Fire fireplace is installed. The Well-Fire is designed on scientific lines. Superheated air is supplied to the fire by means of brass ventilators which are placed on each side of the raised hearth.

It has a regenerative hot air chamber, formed entirely of firebrick, without lining or ash-pan. This chamber becomes intensely hot, and all the air for combustion purposes must pass through it, and consequently reaches the fire at a very high temperature; at the same time it is under perfect control. This is why it consumes less fuel, and gives off more heat than any other fireplace, and will burn, it is claimed, from ten to twenty hours absolutely without feeding or any attention whatever.

Fireplace openings have generally an arch of a very flat curve to coincide with the usual form of mantlepiece, with which it is covered. To prevent the superincumbent weight which comes upon it from thrusting the projecting jambs outwards, an iron chimney bar usually ⅜ of an inch in thickness and 2½ inches wide is placed under the arch. The ends are built 8 in. into the jambs on each side, and frequently split and turned up and down so as to claw the brickwork.

Ingle Nooks.—There has been a revival in our domestic architecture of re-creating the chimney corners such as are found in old-fashioned farmhouse kitchens of England, and to make them desirable and picturesque features in a modern house.

The large old chimney corners mainly existed because of the convenience of burning large faggots or logs when coal and its economies were unknown.

In the modern adaptation of these chimney corners it is required of the architect that his design should take the form of an alcove or recess which would strike one as being both cosy and picturesque.

A common mistake is that they are very frequently made too small and shallow, and unless a width of at least ten to twelve feet and a depth of 5 feet can be obtained, an ingle nook, so called, would be better omitted altogether.

The favorite form has seats on each side of the fireplace, and where a fireplace recess is constructed in a billiard room it is better to keep the floor one or two steps higher than the floor of the room so that a view of the table may be better obtained. It is a good plan also to keep the ceiling of the recess 12 inches or so lower than that of the room, and in this way a ventilating flue may be formed in the frieze on the room side and carried over the ceiling of the fireplace recess into the chimney stack.

Chimney Stacks.—"Chimney stacks," Professor Beresford Pite has said, "are necessary features that the candid designer will reckon with successfully by studied treatment. They naturally refuse to be dissembled with and hidden away in the parapets or blocking courses of cornices; however successful such dissembling may be on a drawing, the presence of the smoke, will, in the actual building, soon be proved by discoloration and the inefficiency of the short flue will bring to its assistance a zinc "tall-boy" as a standing witness against architectural hypocrisy."

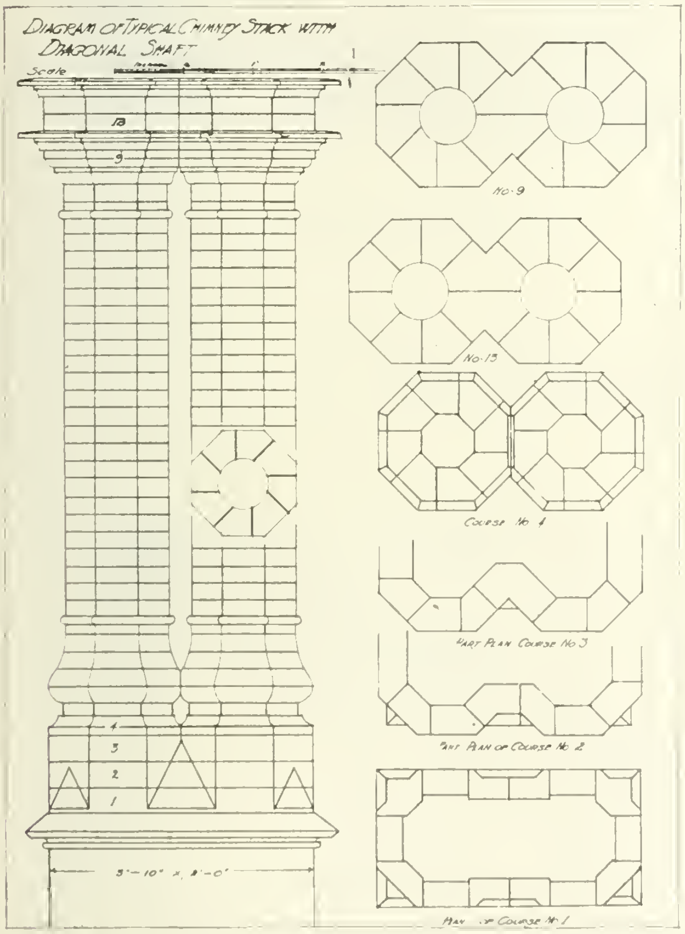


Fig. 10—An interesting chimney stack in brick, with octagonal shafts modelled on an old example, 400 years old.

Roofs that have a fair pitch give the architect opportunities of arranging his chimney stacks symmetrically in relation to each other, and it is well worth an effort to obtain this effect.

The parts of a chimney stack which project above a roof should be built in cement mortar, as it is more exposed to the weather and has less substance, so that the surface decay of the jambs materially weakens the stack. It should also be carried well above any roofs of adjoining buildings. This not only helps to obtain a quick draught but prevents down draughts caused by the deflection of wind from the surfaces of neighboring roofs.

A chimney stack will always look mean and insufficient if it rises less than 3 feet above the roof through which it is built, besides it will barely escape liability to down draughts from the eddies of wind off the upward slopes of the roof. The maximum limit of height fixed by the London Building Act for chimney stacks is that the same shall be six times the least width of the stack at the last point of support. Thus if a chimney is 20 in. wide its greatest height cannot exceed 10 feet. This is a sufficient height above a ridge, but chimneys often rise on the sides and at the bottom of a roof slope.

A lofty chimney stack gives expression and character to a house and affords a good opportunity for studied design. In most old English houses and homesteads there are characteristic and charming chimney stacks, which, without much ornament, by grouping and proportion, will show the architect how to make chimney stacks into interesting and beautiful features.

Archaeologists Discover Beautiful Tiles

AMONG the ruins of the royal palace in Shushan, archaeologists have discovered a number of beautiful enameled tiles, which once formed part of a frieze or wall-decoration. These tiles are now in the museum of the Louvre in Paris, put together to look as they did in their original position. The colors of the tiles are mostly orange and yellowish orange, blue and greenish blue. The four lower rows of tiles and the six upper rows have various ornamental shapes drawn on their surfaces and finished in different colored enamels. The middle part of the frieze is taken up with a procession of lions, striding majestically along, one after the other, with tails lashing the air and jaws open as if for a commanding roar. The two uppermost rows of tiles combine to produce a row of circular disks, like daisy heads, each with fifteen radiating petals; they are supposed to be symbols of the sun, and so, indirectly, of the divine goodness that manifested itself in most striking ways by means of the sun.

In order to obtain a dark body for sewer pipe, especially when fire-clay or stoneware clays are used, it is necessary to get first the right proportion by which the clays are to be mixed. The mixture for sewer-pipe must be a large range between vitrification and melting-point, and this range should be at least from five to six cones so that the pipe will stand up well under fire. A finishing temperature of cone 8 is very good for salt-glazing, but lower temperatures can also be used. When the pipes are burned in a continuous kiln, the burning should be done by reducing the atmosphere, or by very smoky fire. Two chambers which are just finished are filled with an excess of fuel, and then closed up, so that the cooling will take place in a reducing kiln condition. If the kiln is opened too soon the color will not be dark.—Tonind, Zietung.

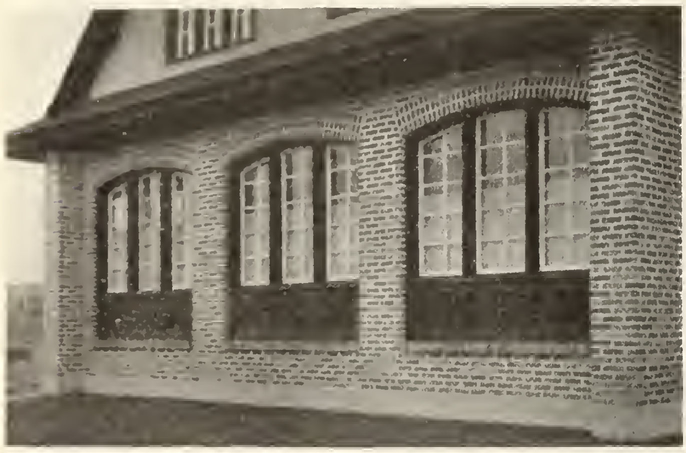
It is a short-sighted man who cannot see that he should get more for his brick than they cost him, but how many clay manufacturers have a cost system in use, by which they can tell the exact cost of their finished product?

A Renaissance in the Use of Brickwork

Modern Progress in Brickmaking and Bricklaying — The Most Expressive Medium at the Disposal of the Architect

By Albert J Hazelgrove, A.R.A.I.C.

Much has been written, and still more has been achieved, in the science and art of brick-making and brick-laying during recent years. A veritable revival of feeling has swept over the architectural world in regard to the proper use of brick, with the remarkable result that what was considered in good taste a decade since, is now regarded as verging on the archaic. Gloomy indeed was the artistic outlook before the modern school of brickwork was founded. The old hand-made brick had many characteristics which made an artistic finish possible, for the very nature of the processes employed gave opportunities for variations and accidents of color and form.



Detail of residence on the Driveway, Ottawa. A good example of multi-colored tapestrybrick-work with flush joints.

It is difficult to see why uniformity of color and texture came to be regarded as such a desirable end in the manufacture of building brick. Mechanical perfection is necessary in many departments of effort, but so essentially a sympathetic material as clay demands a better end than to be squeezed and pounded into the semblance of a block of iron. Such, however, were the ideals of a few years back. The opening up of the field of mechanical as opposed to human effort seemed to stultify nearly all of that artistic sense which was the inheritance of the ages. It is not surprising that the artizans of the period came to regard the mechanical perfection of the machine as the criterion of excellence for the labor of the hand.

With so little artistic feeling in the bricks with which they had to work, it is little wonder that the methods of laying them also degenerated into a merely mechanical function, devoid of all life and spirit. The suppression of the mortar joint was considered paramount, both as regards thickness and distinction in color. The mistake of the period arose in the assumption that the use of a machine for brickmaking was incompatible with the production of an artistic result.

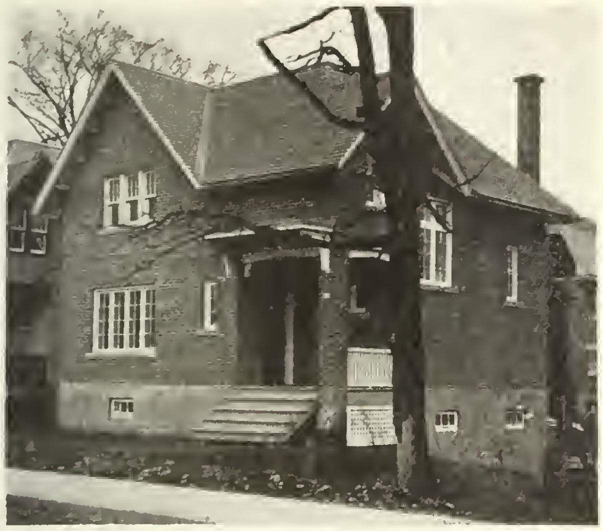
Such a state of affairs could not last for ever, and it is to the everlasting credit of the men who started the work of regeneration, both in Canada and the United States, that as the results of their experiments and foresightedness, the art and craft of brickmaking is coming into its own again.

There is apparently no end to the varieties of brick which are now readily obtainable, and the results are to be seen in the sympathetic manner in which brickwork is being handled in many of the most noteworthy structures that are now being designed.

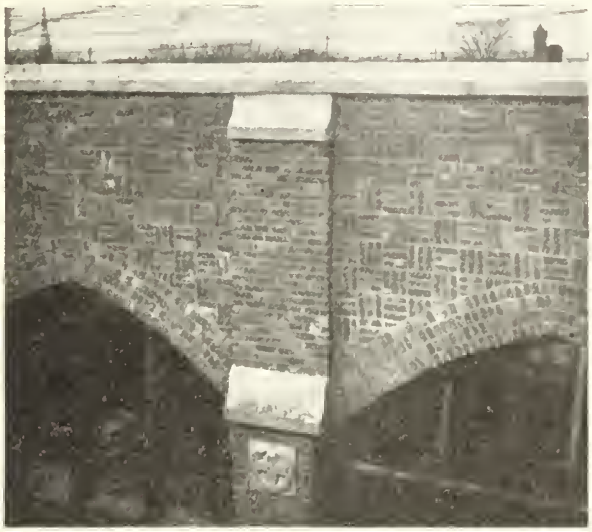
The advent of the artistic brick has opened up a new field of ornamentation, the manner of which is distinctly modern and original. The customary methods of enrichment in the Victorian brickwork were usually by means of moulded, rubbed or carved work, and many beautiful examples remain of this style. In regard to the latter method, however, it is certainly open to criticism as to whether a mass of brickwork, built of soft rubber bricks, laid in a microscopic bed of putty can be regarded as a legitimate field for the art of the sculptor. Any attempt to create a false impression of mass in brickwork, by the suppression and obliteration of the joints, is surely an abuse of one of the most pliable materials with which nature has endowed us. It has remained for the twentieth century to evolve a logical system of brick decoration in which no special or moulded bricks are required, but in which the mortar joint in fulfilling its constructional purpose is also made to serve as a unit in the scheme of ornament. Many wonderful examples of this style have been erected, especially in American cities, in which the ornament in relief is suppressed entirely, and where the sole decoration is formed in geometrical diapers. The very restful effect of such brickwork is all the more pronounced by comparison with some of the florid and fussy work of a preceding generation.

In connection with the use of brick as a paving material, both for outside use and also for verandahs and the like, it is interesting to note the effects which are being obtained by the judicious use of geometrical ornament. The whole basis of the modern idea is the acceptance of the regular size brick as the unit of design, and an examination of the work of some of the best contemporary architects will show how infinite is the variety of designs which have been created. Of course still more wonderful effects are being evolved by the use of bricks of two or more sizes, but in most cases the unit brick has been adhered to rigidly.

It is not, however, alone in great and magnificent structures that the revival of brickwork is to be seen. Brick is par excellence the material for house building, for the possibilities of achieving that abstract quality of personality in a house are best obtained by the use of brick. It is rarely that other materials have the same quality of adaptability to every changing condition. The permanency of brick construction renders it especially suitable as a material for home building, for the initial cost is practically the only cost. Where wood and other materials are deteriorating the whole time from age and decay, the value of

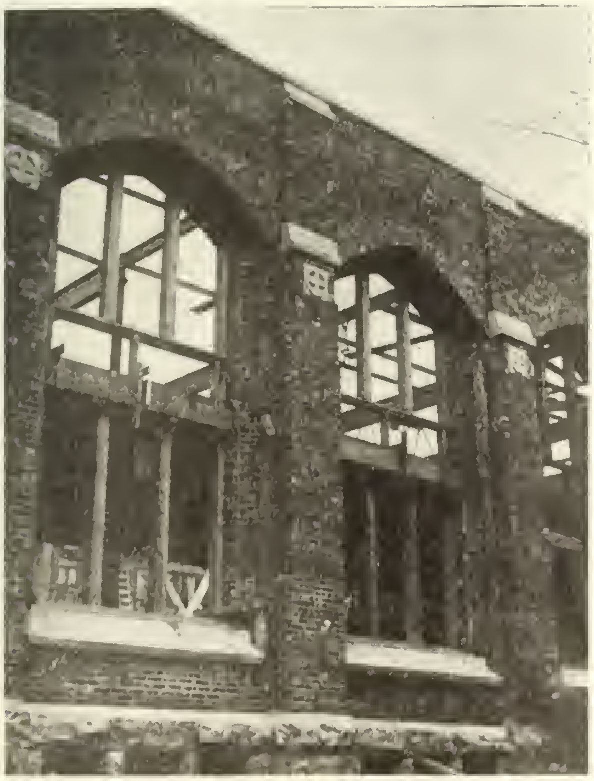


Residence at Ottawa South. An interesting example of the use of local brick in small residence work. Noteworthy for absence of unnecessary ornament.

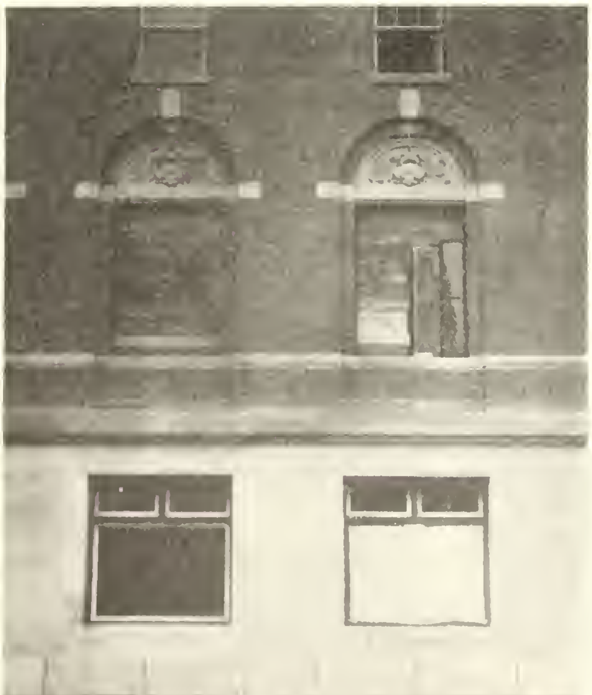


St. Patrick's Parish Hall, Ottawa. Detail of diaper filling over arches. Note the variation in color of the Laprairie brick.

A Renaissance in Brickwork

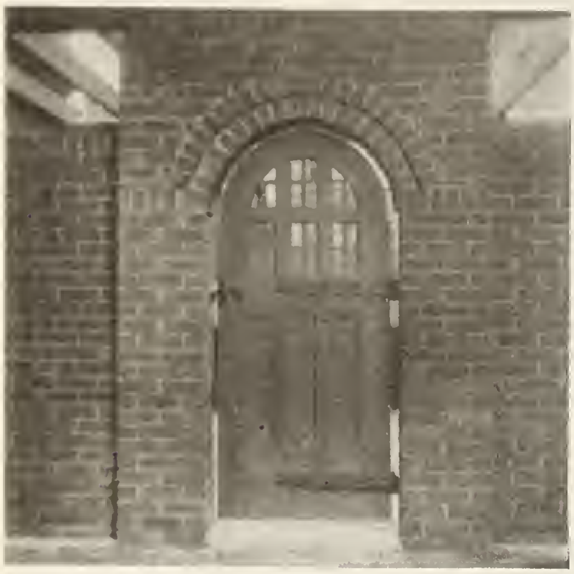


Detail, St. Patrick's Parish Hall, Ottawa. Laprairie plastic brick, with raked out joints. Diaper filling over the arches.



Detail photograph of Laurentian Club Building, Ottawa showing clean cut effect of raked out joints Interesting geometrical band at base brickwork is fixed and permanent, and indeed the mellowing influence of time only serves to enhance its artistic qualities.

The modern brick has a texture and a feeling which almost give life to the inanimate city. Properly handled it is the most expressive medium which the architect has at his disposal, and he can play on its natural qualities to produce the most wonderful harmonies or the most terrible discords, according to the sympathy of his touch and feeling.



Residence at Salisbury Ave., Ottawa. Detail of entrance to kitchen yard. Laprairie rustic brick and raked out joint.

Ancient Drainage Methods

THE earliest mention of artificial drainage is found in the writings of Columnella, who lived in the first century of the Christian era. The following tells of some early efforts at drainage. We know of two kinds of ditches—those wide open and those which are hidden. For the hidden ditches one will dig trenches three feet deep, which shall be filled with small pebbles or pure gravel, and then the whole will be covered with the earth taken from the trench. If there be neither stones nor gravel, the fascines or bundles of branches tied together may be placed in the trench so as to fill the cavity. Apparently the old Roman farmers either did not comprehend the great value of underdrainage or else were sadly lacking in enterprise, as witness the Pontine marshes, with their great fertility, producing only noxious vapors and poisonous insects all through these hundreds of years. It is certain that the Romans used clay pipe as water conduits, and there is some evidence that tiles were used for drainage. During the troublous times that marked the decline and fall of the Roman empire, agriculture made but little progress and the art of drainage was probably forgotten. Proceedings of Iowa State Drainage Association.

The decrease in the output of common brick may be partly accounted for by the increased use of hollow block or tile for the construction of large buildings and even of dwellings. This form of construction offers many advantages, among which are economy in construction, the ease and rapidity with which the material can be put in the wall, and its non-conduc-

Artistic Panels for Montreal Building

THE illustrations on the opposite page show "The Steel Workers," two handsome tile panels recently placed on the walls of the vestibule of the Standard Ideal Company's building at Montreal. Both are executed in weather-resisting glazes and colors. Each panel is 6 feet high and 2 feet wide, made of 6 x 6 tiles with a matt ivory glaze as a foundation for the coloring.

The painting is executed in matt enamel colors applied over the glaze, one advantage of this method of decorating being that any style of historic mural painting can be faithfully reproduced, whereas, with hand-wrought faience mosaic work, the tiles are often so crude in outline that the entire design is completely obliterated. Professor Charles F. Binns gave voice to his sentiments on this subject recently when he declared: "A few years ago architects and builders were seized with a passion for accuracy and uniformity. Brick must be sorted to a mechanical exactness of shade, roofing tile must exhibit the single color of painted tin, each tile matching its fellow, and wall tile must be so true and level that even an oblique light would show no undulation. A revolt was sure to come and architects began to search the cull piles for odd and freakish effects."

"The Steel Workers" have been favorably commented upon by various art journals, trade magazines and daily newspapers. In fact, from an artistic standpoint, this tile work and the method of painting is something quite novel. The style of Fig. 1 is somewhat realistic, while Fig. 2 is very much the opposite and really quite German L'Art Nouveau in conception. As the panels are placed some distance apart, in the vestibule, two distinct styles of paintings were permissible. Cartoons for both were painted and originated by Stewart C. Hinds, the actual painting in ceramic colors being done by Eugene A. DeLan. These artists are members of the designing staff of the Trent Tile Company, which company made the tiles for this contract, and at the present time is doing a great deal of tile work in overglaze decoration. They have just submitted a sketch for a panel, done by this method, for a cafe in Bombay, India. The subject portrayed is a scene from the Durbar Royal Parade at Delhi, India, at the time of the coronation of the late King Edward VII. as Emperor of India.

The architect of the Standard Ideal Company's building is Mr. J. Wechselberger, of Montreal, and the order for "The Steel Workers" was taken by Mr. J. J. Laferme, Canadian representative of the Trent Tile Company, who has at his office in this building a full line of their glazed and unglazed tiles on exhibition.

IN old Flanders, in the northwest corner of France, was located the convent of Maubenge with its famous "Magic Garden." It is claimed that this garden was drained by tile as early as the beginning of the seventeenth century. Klippart, in his second edition of "Land Drainage" publishes a letter from a Frenchman, who claimed to have in his possession two drain pipes taken from drains laid in the above named garden not later than the year 1620, which so thoroughly drained the garden that it was noted for its wonderful productiveness. On the strength of the claims made for this celebrated garden, the French claim that they were the first to use tile for artificial drainage.

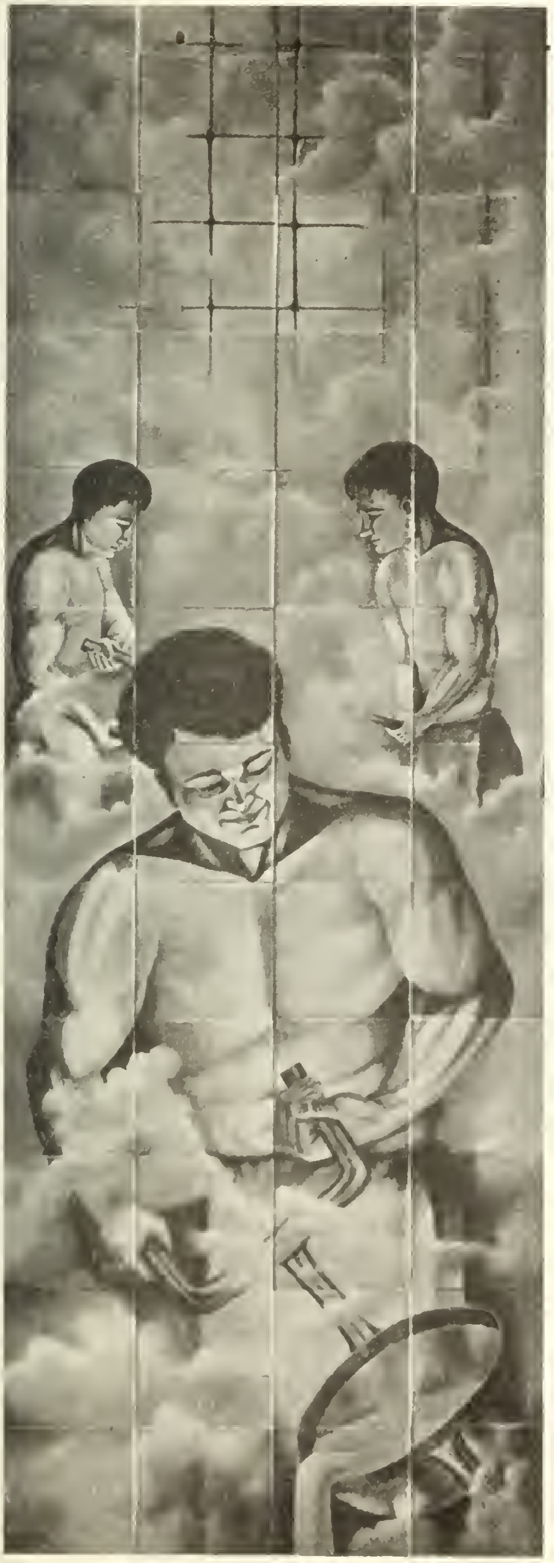


Figure 1 — "The Steel Workers." Realistic tile panel made by the Trent Tile Company.

The Steel Workers

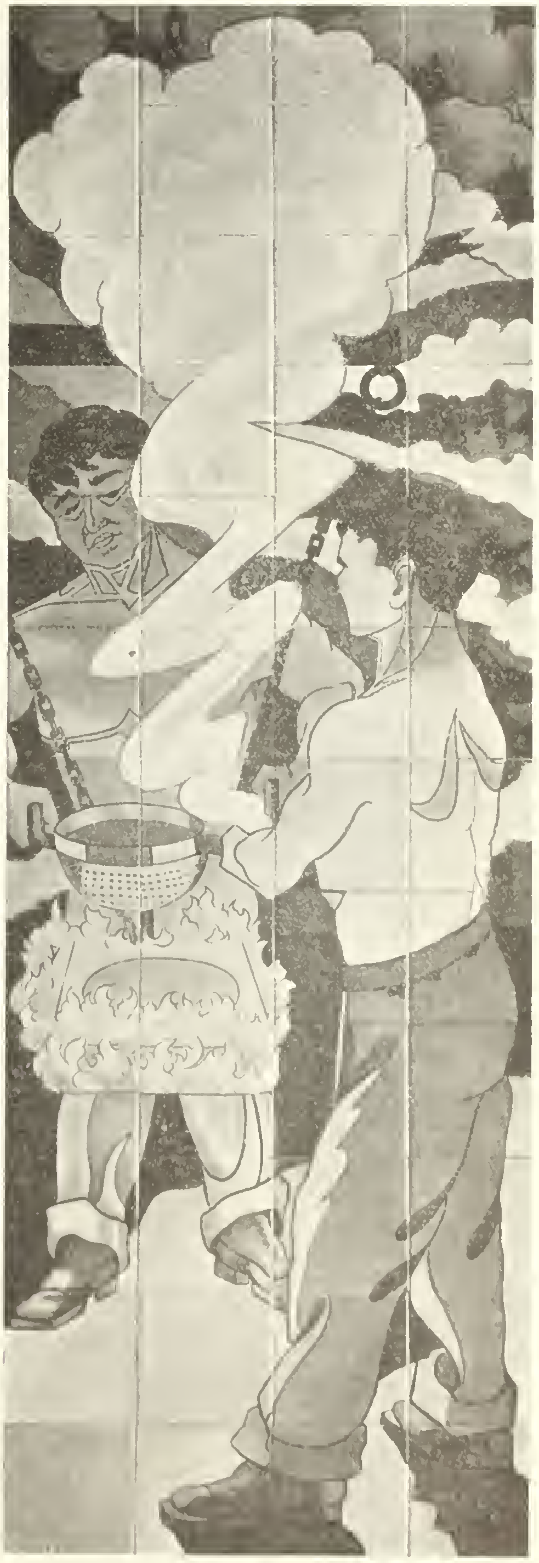
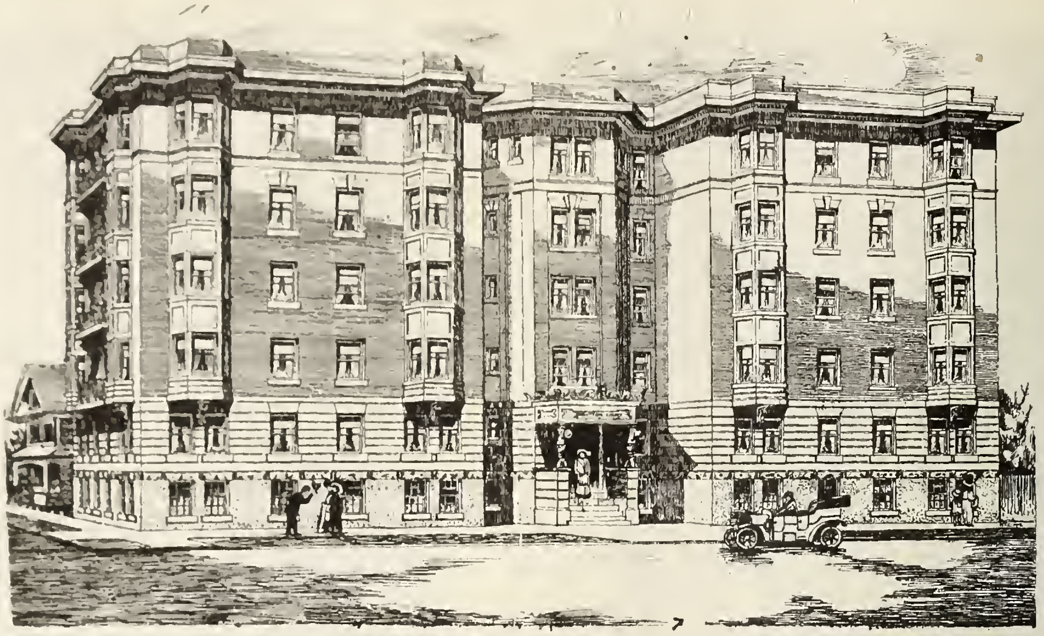


Figure 2 — Idealistic conception of "Steel Workers," executed in tile panel for Montreal building

Artistic Panels for Montreal Building



Hampton Court Apartment House, Vancouver. Architects, Messrs. Grant, Henderson & Cook.

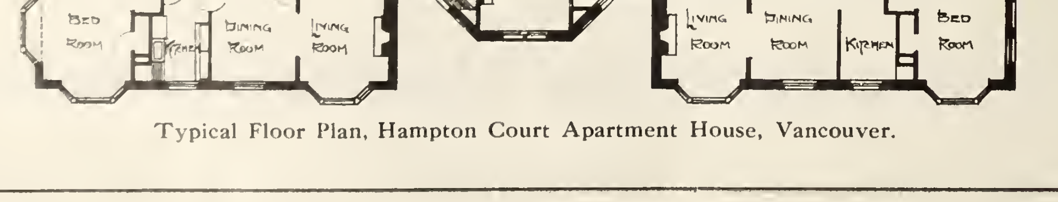
An Attractive Apartment House, Vancouver

THE accompanying plans of an apartment house, recently erected in Vancouver, B.C., by Messrs. Grant, Henderson & Cook, architects, show a building five storeys and basement in height, covering ground area of 50 ft. x 131 ft., open on three sides. The structure is of brick and concrete, faced with buff-colored pressed brick and dressed sandstone trim. The interior is solid mill construction. Over twenty tons of mineral wool was used for fire retardent and sound deadening purposes.

Each floor has five complete suites, providing a living room and dining room (connected by sliding doors) two bedrooms, a bathroom and a kitchen. The kitchen is fully equipped with pantry fittings, folding bake board and ironing board with electric iron, gas range and cold air closet. Each suite has an open fireplace with ash chute to basement, delivery locker, telephone, house 'phone and fire alarm. One half of the basement is devoted to domestic servants' quarters, while the other half contains accommodation for the janitor, the hot water heating plant, laundry and drying rooms, service and delivery lockers, etc. The elevator is automatic, of push button control, in a fireproof shaft. The cost of erecting this structure was $100,000.

Novel Methods Used

WE should hardly expect to learn much of the arts of civilized life from the tribes of central Asia, yet it seems that they make better brick than we turn out. The barbarians employ the same material that we do, and, curiously enough, the thing that imparts superiority to their process of brickmaking is one of the powerful agents of Western civilization—steam. When the Asiatics have baked their brick for three days, the opening of the oven is closed with felt, which is kept wet, so

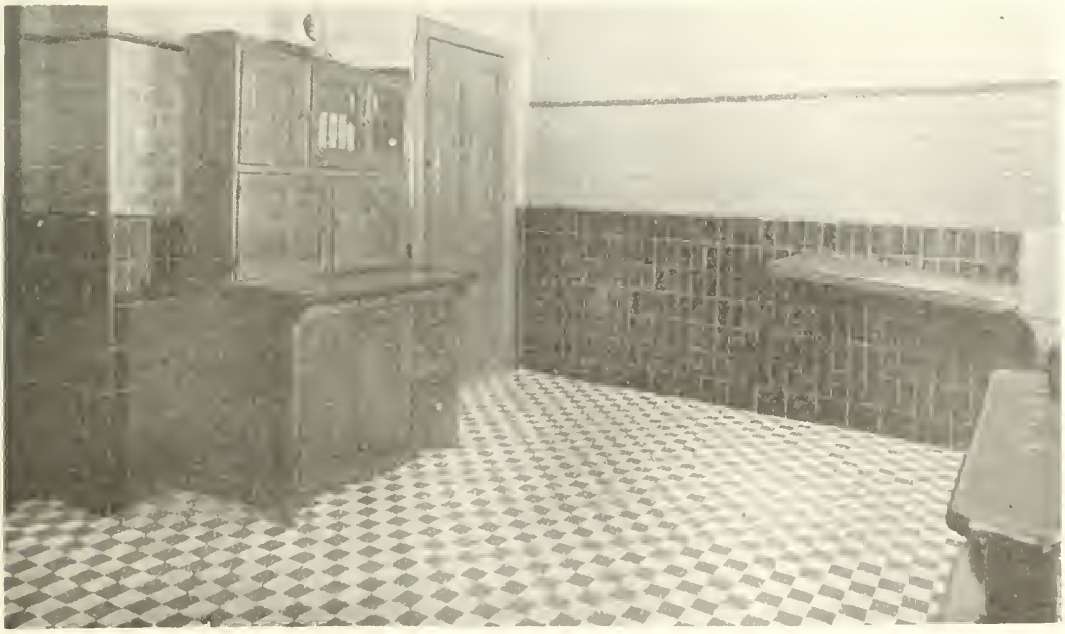


Typical Floor Plan, Hampton Court Apartment House, Vancouver.

that the brick intensely heated, are enveloped in steam. The process causes a remarkable change in the character of the brick. From red they turn gray, and at the same time acquire a remarkable degree of toughness and hardness. Although porous, they give out a sound when struck like that of clinkstone, and they are said to resist the efforts of weather much better than do the brick of Western make. Necessity was the mother of invention in this case, for the climate in which these ingenious Mongols live is subject to great extremes of temperature, producing a disastrous effect upon brick made by the ordinary process.

A Tiled Kitchen

THE accompanying illustration shows the tile work in the kitchen of the residence of Mr. John C. Hills, Trenton, New Jersey. The glazed wall tiles as applied here are all in colors; the darker portion, as shown in the cut, being in an ivy green, while the upper part is a light cucumber, with cap and liners in yellow tan.



A Kitchen Interior. Illustrating a desirable and satisfactory field for the application of tile.

The floor is laid with three-inch vitreous, unglazed squares in green and white. The tiles were set just as the kilns produced them, no effort whatever being made to conceal the joints between the pieces. Five or six different sizes were also used, which made quite irregular lines and joints of various widths. This, however, is the proper way for all tiles to be applied. Naturally colored gray cement was used for the grouting, this being much better than white, as the latter only becomes discolored in time, and if gray be used originally, the joints are dark in the beginning and will remain so permanently.

The time has arrived in this country for tiles to be set artistically and it is not supposed a floor composed of them should look like linoleum, plastic composition flooring, or any other imitative material. The old-fashioned idea that tiles should be precisely the same shade when set is rapidly disappearing. The modern school of decoration has discarded this notion of dead uniformity of color in favor of natural variation, as in wood, marble and brickwork. It has also advocated the recognition of construction lines as essential to good design. The brick wall is no longer laid with hair joints, the mortar being colored to match the brick, but the inevitable joints are frankly recognized as a necessary part of the structure and therefore an essential in the scheme of color. The same is true of tile, as it is not pretended the whole floor or wall is one piece of clay; consequently no attempt should be made to conceal the joints between the pieces. The idea is that of construction and the work should honestly show how it is put together. In setting the tiles in Mr. Hill's kitchen the above method was strictly adhered to, as several different shades of each color were used, first alternately then set at random, which can be applied to white as well as colored.

This is the age of fireproof construction, and as all clay products are thoroughly fireproof, as also sanitary and everlasting, it is quite certain in the very near future the application of tiles to the kitchen, even in moderately priced homes will rapidly develop. There is at present a growing demand for the use of colored tiles. This is as it should be; in fact, in a great many of the finest residences they are being applied exclusively to both walls and floors in the bathrooms, no white being used whatever. The application of colored tiles for the exterior decoration of concrete and brick buildings has also become quite extensive.

Tiles, both glazed and unglazed are now available for public and private buildings of all classes, and in fact it does not require very much imagination on the part of the architect to find new uses for them every day. Almost everyone is familiar with the application of tiles in our modern office buildings, hotels, railroad stations, churches, etc. For this reason our present article and illustration are confined to the use of tiles in the kitchen only, as above all places in the home this should be sanitary and constructed of permanent materials. It is where the food is prepared and absolute cleanliness is essential. Tiles answer every requirement and, as stated, it is our belief, that in the near future they will be used extensively in even the most inexpensive dwellings.

The tiles for Mr. Hill's residence were made by The Trent Tile Company, Trenton, New Jersey.

The History of Brickwork at Montreal

Rapid Development of Late Years—The Possibilities of the Material as Illustrated by Recent Examples

By E. F. Dartnell, Montreal

IN the early days of Canada, more especially during the French Regime in what is now the province of Quebec, brick appear to have been but little used. In the country generally, wood, costing little or nothing, was usually employed; or in sections of the country where stone was plentiful, as in the cities of Quebec and Montreal, stone was used for the walls in the better class of building. In those early days, probably the only brickwork was in the larger ovens, or the lining of fireplaces, and what few brick were so used were probably brought out from old France. These brick were hard burnt and of good quality, but small.

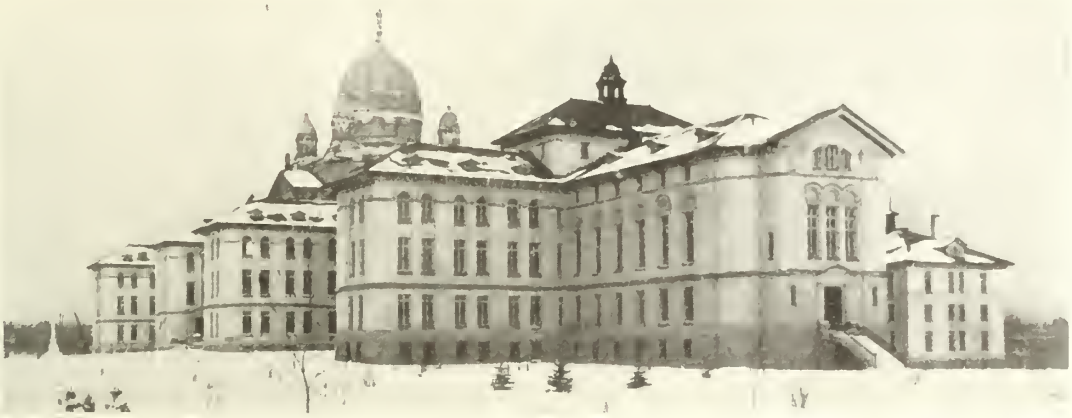
Montreal Technical School, 70 Sherbrooke St. West. Built of white vitrified Kittanning brick. Architects, Messrs. Saxe & Archibald; contractors, Messrs. Peter Lyall & Sons

In later years, after Canada became a part of the Empire to which we now all belong, brick, in the course of time, were made locally and used to a certain extent in building, but mostly for the rear and side walls of those with stone fronts, and for a class of building cheaper than stone, but more substantial than frame.

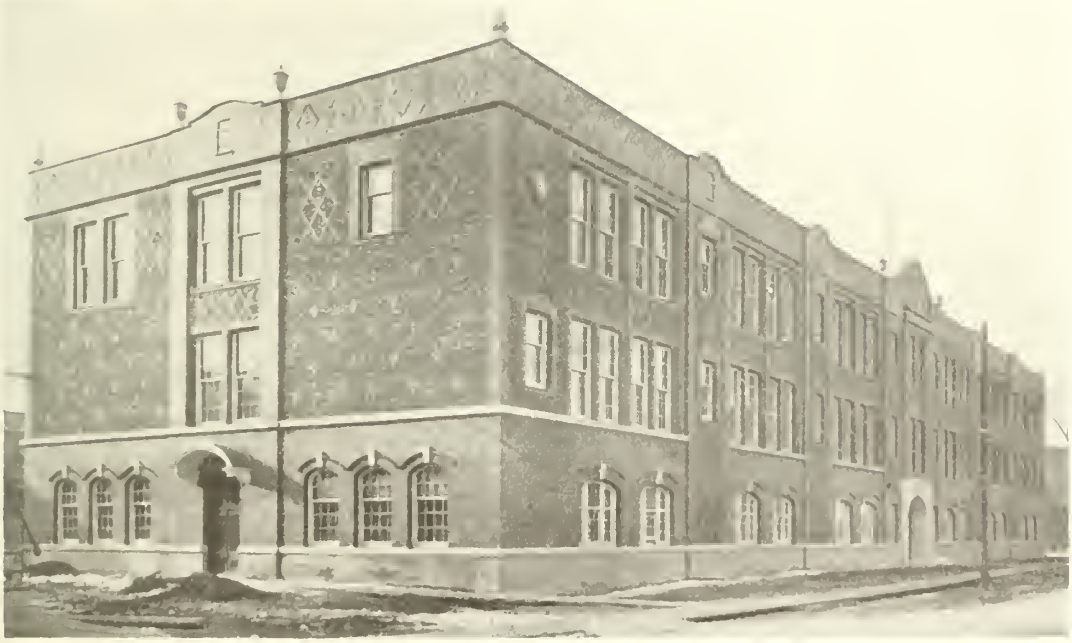
The use of the higher classes of face brick, to any great extent, has only taken place within recent years. Among the first of the pressed brick buildings of any note erected in Montreal was the red brick dwelling of the late Sir John Abbott, on Sherbrooke Street. This was afterwards altered into the Mount Royal Club, which was subsequently destroyed by fire, and on the site of which the present club building of stone was erected. This was followed by the Waddell building on Notre Dame Street (now owned by the Sun Life Insurance Company), and the Young Men's Christian Association Building, on Dominion Square, now being demolished to be replaced by a large modern office building. All these buildings were built with facings of imported red brick.

About this time the Ontario pressed brick yards commenced sending their products to Montreal. Among other buildings in which Ontario brick were used were the High School buildings, on Peel and Metcalfe Streets, which have recently passed out of the hands of the School Board and are shortly to become a thing of the past. Then yards in the near vicinity of Montreal came into the field and commenced making red pressed brick, and the pressed Brick Era may be said to have commenced. Previously to this—and indeed up to very recently—scarcely any one would think of erecting a high cost building of brick: It must, at least, have a stone front. At this period the Montreal Diocesan College, on University Street, which is a gem in its way, was erected. This was built of local red pressed brick, with buff sandstone trimmings.

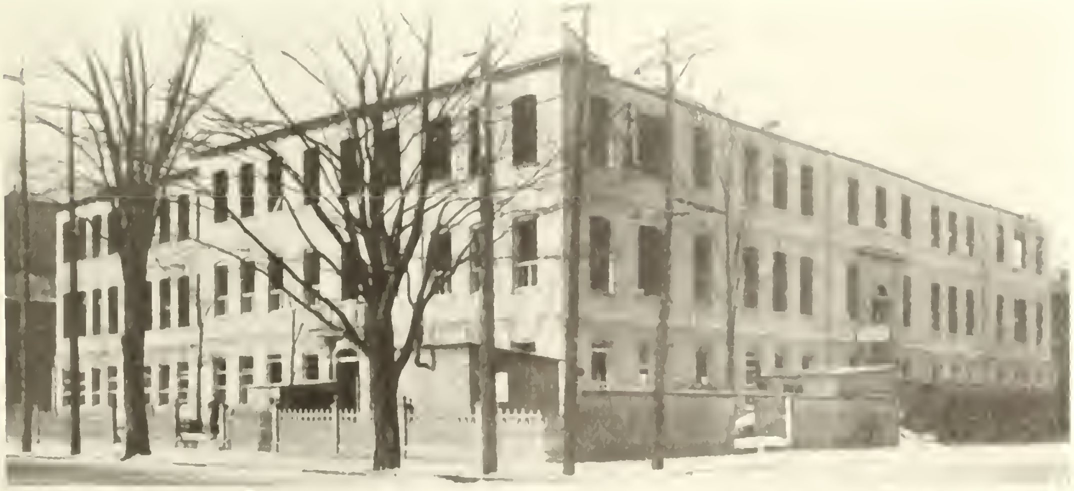
Buff dry pressed bricks from the neighborhood of Toronto also came into vogue and were subsequently used in La Presse building, on St. James Street and St. Lambert Hill, and in the new building now occupied by the Richelieu & Ontario Navigation Company, Victoria Square. Then the Bell Telephone main office building on Notre Dame Street was built with an American buff brick. About the same time the use of Scotch firebrick for building purposes commenced, one of the first buildings in which they were employed was the Taylor Presbyterian Church, on Papineau Avenue, and afterwards in a number of other buildings, including the Canadian Pacific Telegraph Building, on St. Francois Xavier Street, and the Place Viger hotel and station, and on the residences of Edward Maxwell, Esq. (of Messrs. E. & W. S. Maxwell, architects), Upper Peel street. Some of the effects obtained with these brick are very good.



Mother House of the Ladies of the Congregation of Notre Dame, Sherbrooke St. West. White Kittanning brick. Architects, Messrs. Marchand & Haskell. Contractors, Messrs Martineau & Prenoveau.



King Edward VII School, Esplanade and Van Horne Avenues. Red "Tapestry" brick. Architects, Messrs. Nobbs & Hyde; contractors, Messrs. Byers & Anglin, Limited.



New Dental College, Laval University, St. Hubert & Demontigny Sts. White "Shawnee" brick. Architect, Mr. G. A. Monette; contractor, Mr. O. Archambault.

Dwelling of De Gaspe Beaubien, Esq., 462 St. Catherine Road, Outremont. Golden "Tapesty" brick. Architects, Messrs. E. & W. S. Maxwell

In the last few years, brick in great variety of color, shade, texture and size, have been used. Probably the largest brick building, or group of brick buildings, in Montreal is the Mother House of the Ladies of the Congregation of Notre Dame, on Sherbrooke Street West, of which Messrs. Marchand & Haskell were the architects. This is faced all round with a smooth white (or grey) vitrified Kittanning brick. In the Montreal Technical School on Sherbrooke Street, another group of large buildings, a somewhat similar brick has been used. An illustration of the main building is given.

Recently, several of the large down-town buildings have put up with their facings largely of brick. Among these are the new Herald Building, on Craig street, the Shaughnessy Building, on McGill street, and a large number of schoolhouses, apartment houses, dwellings and other buildings, more especially in the suburbs of Westmount and Outremont.

The new King Edward VII. school on Esplanade and Van Horne Avenues, illustrated herewith, is a good example of red rough faced ("Tapestry") brick. The dwelling of De Gaspe Beaubien, Esq., 462 St. Catherine Road, Outremont (Messrs. E. & W. S. Maxwell, architects) is an example of the lighter shades of "Golden Tapestry."

One of the best pieces of brickwork in the immediate neighborhood of Montreal is a garage on Sydenham Avenue, a little west of St. George's Club House, on the Westmount mountain. This is built of a "Tapestry" brick of a dark grey color, shading off into a coffee brown (illustrated herewith). Another good brick building is the new Dental College in connection with the Laval University, situated on the corner of St. Hubert and DeMontigny Streets, an illustration of which is also given.

Where one sees the wonderful possibilities in brick (as shown in the work of the better class of architects) that is generations and even centuries old, one observes a beauty of color, texture and durability that cannot be excelled by any stone or marble. One cannot but wonder why high-class artistic brick work is not more plentiful.

In New York and other large cities of the United States, brick are now being used to a considerable extent for decorating interior walls. They are so used in the entrance lobby of the Otis Building, New York, and in the Tap Room of the Hotel Belvedere at Baltimore, Md. This work is of a warm rich color, is very effective and costs less than marble.

George S. Street, F.S.A., in his well-known work "Brick and Marble in the Middle Ages"—published at London in 1885 and a standard to-day—gives many excellent examples of the proper use of brick. Speaking of their use in Italy, where practically only red were employed, he says that there is no reason why we should not enliven our work with other colors. He also refers to the prejudice many people then had—a feeling that has by no means disappeared—which caused them to look upon brick as being fit only for common and mean purposes, while stone as an architectural material was almost worshipped. He goes on to say: "What now mainly remains to be done is to show how it may be used most effectively, not only in external, but also in internal work.

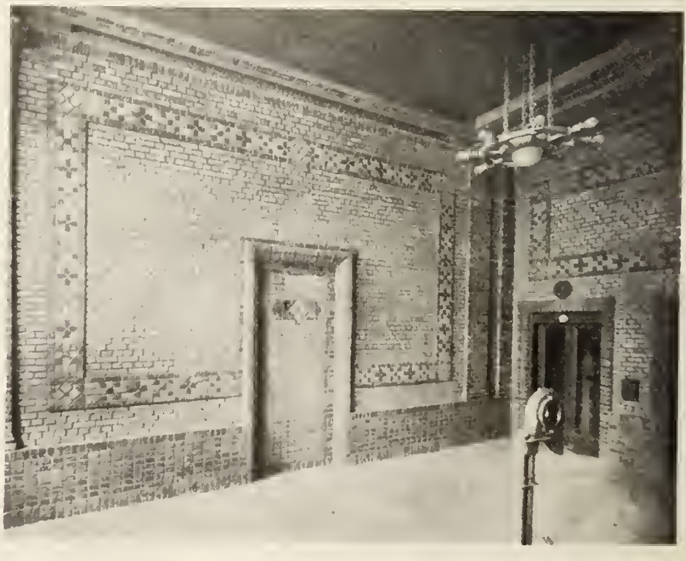
"At the present (1855) there is, I think, absolutely no one point in which we fail so much, and about which the world in general has so little feeling, as that of color. Our buildings (he is speaking of England) are, in nine cases out of ten, cold, colorless, insipid, academical studies, and our people have no conception of the necessity of obtaining rich color, and no sufficient love for it when successfully obtained. The task, therefore, and the duty of architects at the present day is mainly that of awakening, and then satisfying this feeling; and one of the best and most ready vehicles for doing this exists, no doubt, in rich colored brick, which if properly used, may become so effective and admirable a material."

Alternating Red and Black

He then refers to the custom in Northern Germany of using the frequent alternation of red and black brick, as also that of our English forefathers of using courses of flint among other stone and brickwork, and says:—"The system was a thoroughly sound one because it not only proceeded from and depended on the material, but afforded the best possible means for displaying the various colors which were to be used.

"Our buildings should, both outside and inside, have some of the warmth which color can only give; they should have enabled the educated eye to revel in bright tints of nature's own formation, whilst to the uneducated eye they would have afforded the best possible lessons, and by familiarizing it with, would have enabled it to appreciate the proper combination of color and form.

"Oh for the days when, as of yore, color may be



Entrance lobby of Otis Elevator Building, 11th. Avenue, 26th & 27th Streets, New York. Interior decoration of golden "Tapestry" brick, furnished by Messrs. Fiske & Co., Inc.

appreciated and beloved, when uniformity may not be considered beauty, nor an ugly plainness to be considered a fit substitute for sincerity! Oh, too, for the days when men shall have cast off their shame-faced dependence on other men's works and the art of other ages, and, like true men and faithful, shall honestly and with energy, each in his own sphere, set to work to do all that in him lies to increase the power of art and to advance its best interests!"

About three years ago in a hurried business visit to Antwerp, I had hoped to see some of the brick work I had seen in illustrations of that city, but I was greatly disappointed. Paint had been used on almost all of their brick buildings, and while it gave a newly-washed appearance to the houses, the whole of the artistic texture and coloring had vanished. Possibly if I had had time to visit some of the older and more neglected parts of the city, I might have come across some brick buildings which had been spared the indignity of the paint-pot—which no reputable, self-respecting brick should ever be allowed to come into contact with.

Effective Use of Flint

In many places in England, courses of flint among the brick are common and very effective. In two or three cases I came across walls in the neighborhood of old glass works in which rough and overburnt brick, and bats and flints, together with lumps of refuse slag from the glass furnaces, had been all built in, apparently without an attempt at order or arrangement, but with most charming results. The effect of the glass slag is very good, if having a green color which harmonizes with the red and black brick.

Many of our architects would like to use high-grade artistic brick to a much greater extent than they do at present, but their clients are not yet educated up to their use and not willing that a change from the old lines should be made. There is, however, a gradual improvement taking place in this respect.

One good brick building, well designed by the architect and properly handled by the contractor, becomes an example for others to follow.

For many years Montreal has forbidden the erection of buildings of wood within its limits; consequently we have been spared here the large number of high cost wooden dwellings that have been so much in vogue in many of the high-class residential streets of cities in the United States.

Montreal Diocesan Theological College, University St. Red pressed brick, with buff sandstone trimmings.

Garage on Sydenham Ave., Westmount, built for the late Hudson Allison. Grey "Tapesty" brick of the darker shades. Architect, Mr. R. E. Bostrom; contractors, Messrs. H. C. Hitch & Co.

What is a Brick?

We consider it is the highest compliment to a man in this country when we dub him a "brick," but foreigners do not always understand our slang, as is demonstrated by the following anecdote:

Franklin Matthews, a war correspondent, who went abroad with the great battleship-fleet, while stationed near Mukden, met Field Marshall Oyama, and while talking with him became impressed with his personality and excellent education, so that when he returned to his quarters he wrote a two-hundred word cablegram to the officers in the United States in which, among other things, he said:

"I find Marshall Oyama a brick."

This was sent to the interpreter who translated it in Japanese and sent both copies to the army censor. That afternoon Matthews was questioned by the commanding captain regarding the cablegram and especially concerning the expression "You are a brick."

Matthews explained to him that in America when you call a man a "brick," you mean he is a "splendid chap—fair and square, and all that." The captain smiled the Japanese smile and said: "Your interpretor was very clumsy. He translated the word 'brick' literally, making it read 'a lump of dried mud,' which puzzled me greatly. I am glad of your explanation."

The paving brick maker should make frequent tests of his product that he may know whether he is producing brick to meet with the specifications, and samples from every kiln or every carload shipped should go into the tests.

The clay manufacturing world is awakening to the possibilities of modern sales methods—of advertising, of efficiency on the distributing end of the business as well as the manufacturing.

While the brick manufacturer's life is far from being a continual round of pleasure, it is comforting to remember that there is no business in the world that has no rough spots in it.

National Brick Company's plant at Laprairie, Que. The new plant is on the right of view.

The Shale Brick Industry of Quebec

Deposits in the Vicinity of Laprairie and Elsewhere—Characteristics of the Various Shales — The Principal Plants*

By Joseph Keele

THE rapid growth of the city of Montreal during the last ten years, and the replacing of older buildings in the central portion of the city by modern structures, has occasioned a demand for a local brick in large quantities, of better quality than the common brick, hitherto made from surface clay. To meet this demand, four large plants have been erected in recent years on the south side of the St. Lawrence River, situated at Laprairie and Delson Junction, fourteen to eighteen miles from Montreal. The materials used for the manufacture of the bricks are shales of the Utica-Lorraine series of the Ordovician system, and Leda clay, the latter being the surface clay which occurs so widespread in the St. Lawrence Valley.

The shales in the vicinity of Laprairie occur in thin flat lying beds or layers, which are alternately light grey and gritty and dark grey smooth clayey layers. The latter crumble into small fragments soon after exposure to weathering, but the gritty or sandy layers break down slowly.

The Leda clay is usually grey in color, very plastic in its upper portion, and slightly calcareous. It is almost entirely free from pebbles, but sometimes holds hard calcareous concretions. Its name is derived from the presence in it of shells of Leda glacialis, but these only occur sparingly. Both the shale and surface clay are red burning.

The shales, which come nearly to the surface in this locality, are mined to a depth of six or eight feet with steam shovels. The teeth of the shovel takes hold between the horizontal layers of shale and lift it without much difficulty. The shovel dumps its load into steel trucks, which are hauled to the machine sheds by a small locomotive. The shale, when ground in the dry pan, is rather gritty, and while dry pressed facing bricks can be made from it, the plasticity necessary for making stiff mud or wire cut bricks is lacking. The plastic ingredient is supplied by the surface clay. During the earlier years of working, a thin layer of clay overlying the shale was found to be sufficient for the purpose, but this has been stripped from the property adjoining the older works. The surface clay is now obtained at Little River, a distance of two miles from the works, and brought in over a tramway. The clay is mixed with the shale in the proportion of about three parts of shale to one of clay, and sometimes a larger proportion of clay is used. The clay is passed through rolls and fed into the pug mill with the ground shale, making a very smooth working mixture, which comes through the die without tearing.

The Laprairie Plants

The plant of the National Brick Company at Laprairie is the largest brickworks in the province, and one of the largest in Canada. It is in two parts, an old plant using steam power and a new one operated by electric power. The whole plant is equipped with eighteen dry pans, three sets of rolls, four Berg dry press machines and three stiff mud machines. The stiff mud bricks are wheeled into artificial dryers as they come from the machines. The waste heat from

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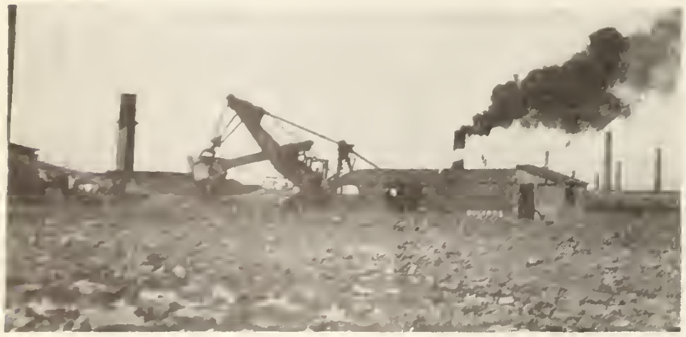


Fig. 2—St. Lawrence Brick & Terra Cotta Company's works. Steam shovel working in shale.

Fig. 3—St. Lawrence Brick & Terra Cotta Company's works, Laprairie, Que.

the kilns that are cooling down is driven through the dryers by means of fans, and the bricks are dried in eighteen to twenty-four hours. The burning is done in eight 16-chamber continuous kilns and thirteen down draft kilns, the fuel used being coal. The shale and clay burns to a good deep red, but a buff dry pressed brick is produced by adding a certain quantity of carbonate of lime to the shale. A limited number of the latter variety are faced with white enamel, four muffle enamelling kilns being used for this purpose. A special rough faced brick, known by the trade names of tapestry and rustic, is also produced. These are made in the stiff mud machine, the rough face being obtained by fixing an upright wire near the die, so that a thin skin is scraped from one face of the bar of clay as it issues from the die.

The theoretic output of this plant is 400,000 bricks per day of ten hours, of which 65,000 are dry pressed, but various accidental causes often tend to reduce this amount in practice.

The bricks are shipped to Montreal by rail, and delivered to the various building sites in motor trucks owned by the company. The price obtained for common stiff mud bricks, delivered, is ten dollars per thousand.

Plant of the National Brick Company at Delson Junction, Que.

The St. Lawrence Plant

The recently built plant of the St. Lawrence Brick and Terra-Cotta Company is situated a short distance west of the National Brick Company's works at Laprairie. This company has one stiff mud machine in operation, and burns in two continuous kilns of sixteen chambers each. The shales worked here are identical in character with those used by the National Brick Company, and a light overburden of clay conveniently supplies sufficient plastic material. This company produces nothing but common stiff mud bricks, the amount being about 125,000 per day. The plant is being enlarged to double this output.

National Brick Company's Plant at Delson Jctn.

The National Brick Company have recently built another plant at Delson Junction, about four and a half miles west of Laprairie. The Canadian Pacific Railway line between Montreal and Sherbrooke intersects the Grand Trunk line at this point. The new plant was put in operation in June, 1912, the equipment consisting of eight 9-foot dry pans, and two stiff mud machines, built by the Raymond Brick Machine Company. The burning is done in four 16-chamber continuous kilns. The artificial drying is done in tunnels heated with the waste heat drawn by fans from the kilns that are cooling down. Two small furnaces also contribute heat for the dryers. The green bricks can be dried safely without cracking, in twelve hours if necessary.

The plant, which is driven by electric power, is said to contain the latest improvements known in the clay-working industry. The materials used for brickmaking are boulder clay, Utica-Lorraine shale, and Leda clay. The boulder clay overlies the shale, and a portion of the latter is taken up by the steam shovel when excavating in the pit. The tramway leading from the works to the boulder clay pit, cuts through a deposit of Leda clay. The latter, which is free from pebbles, is shovelled by hand into the cars.

The matrix or clay, which holds the pebbles together in the bank, is mostly composed of shale which has become finely disintegrated by glacial action. The upper part is weathered to a brownish color, by oxidation of the iron content, while the lower part, below the zone of weathering, is of a blue color.

The stones in the deposit over the shales are of all sizes, from boulders three feet in diameter down to the smallest pebbles. The large boulders are left behind in the pit, when working the deposit, the smaller boulders are thrown out at the works before the material enters the dry pans. The smaller stones are allowed to go through the pans, the plant being supplied with sufficient power to grind the hardest pebbles, including granites and quartzites. These will no doubt tend to cut out the wearable portions of the pans quicker than if shale alone were used. An output of 250,000 bricks a day is claimed for this plant. Only common stiff mud bricks are produced.

All these plants can, and do produce a good hard densely burned brick, from the materials they are using. Their best quality is structurally sound, and very superior to the common brick made entirely of surface clay. Unfortunately, the insistent demands of contractors for building material during the busy season, leads to hasty methods in brickmaking which result in lowering the average quality, especially of the common wire cut brick. The dry pressed brick, however, are carefully made and burned, generally arriving on the various building sites in good condition.

The Quebec plants are all under the direction of fully competent and energetic superintendents, but the generally deficient and uncertain supply of labor affects them adversely. These industries have not been installed long enough yet to hold a supply of skilled labor permanently in the vicinity.

The output of the shale brick plants now in operation is not yet sufficient to supply the demand in

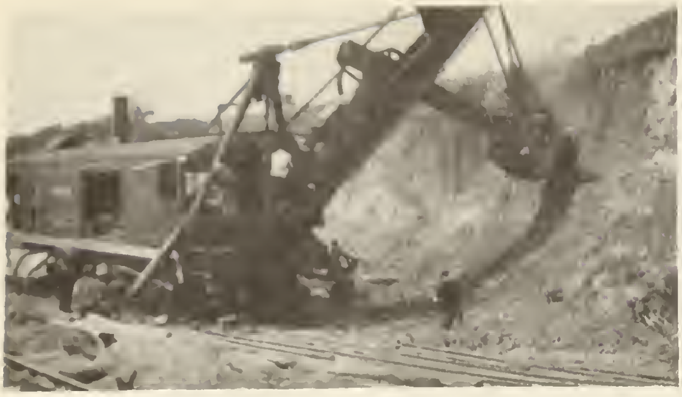


Fig. 5—Steam shovel at work on bank of boulder clay at National Brick Company's plant, Delson Junction, Que.

Montreal, and other companies are looking for locations near this market. There are still some desirable sites for brickmakers on Utica-Lorraine shale areas from fifteen to twenty miles from the centre of the city, but owing to the activity of the real estate dealers, who have extended their operations to these outlying districts, the prices asked for these locations are prohibitive to such an industry.

The city of Quebec has not as yet developed the activity in building and the increase in area that so many of the cities in the Dominion have shown in recent years. This city, however, with its fine harbor, will undoubtedly become the summer terminal point for a large part of the constantly increasing volume of ocean travel and freights. The local brick industry has hitherto been confined to a few common brick plants which use the rather indifferent surface clays of the St. Charles River Valley.

An escarpment of Utica-Lorraine shale which borders the north channel of the St. Lawrence River and approaches within a few miles of the city of Quebec has attracted the attention of brickmakers in search of better materials than the surface clay. A shale brick plant which will be known as the Citadel Brick and Paving Block Company, Limited, is under construction at a point about six and a half miles from the city, and a short distance beyond the Montmorency Falls,

The area at the disposal of the company for erecting the plant is restricted to a narrow strip between the foot of the shale escarpment and the line of the Quebec Railway, Light & Power Company.

The works will be equipped with two dry pans and one stiff mud machine and one repressing machine, driven by electric power. Hot air dryers with independent furnaces will be used, and the burning done in two 30-foot circular kilns.

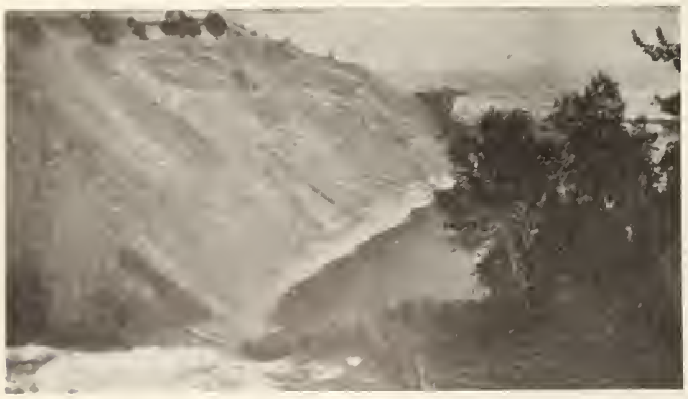


Fig. 6—Escarpment of Utica-Lorraine shales, looking from bridge over Montmorency Falls, Que.

The shales in this vicinity grind down easily, and give a more plastic product than those at Laprairie, so that it will be unnecessary to mix in any plastic surface clay. There is a quantity of loose overburden, composed principally of weathered shale, lying in places on the solid material. This could also be worked up for brickmaking if it were not for the fact that it contains pebbles and fragments from the Trenton limestone beds at the top of the escarpment. As the solid shale contains a rather high percentage of lime, any further addition of it would be detrimental. The overburden could probably be worked up for terra cotta lumber or fireproofing.

It is doubtful if vitrified ware can be made here, as the fusing point of the shale is not far removed from the vitrification stage in burning. The company, however, intend to begin on wire cut and repressed bricks for building purposes, and will not attempt the manufacture of the vitrified products until the behaviour of the shales in the kilns is known by experience.

Some unworked deposits of red Medina shale occur in Nicolet County, near St. Gregoire, and also on the Becancour River. The first named deposit is situated near the intersection of the Montreal, Quebec and Southern and the Grand Trunk railways, at a distance of seventy-five miles northeast of Montreal. These shales burn to a dense red body at low temperatures, and are plastic enough to use in a stiff mud machine, without the addition of surface clay. They are useful for making wire cut or clay pressed bricks and fireproofing. The Medina shales are not worked at all in the province of Quebec, but they are used at various points between Toronto and Hamilton in Ontario. Several samples of shales and clays were recently collected by the writer in various parts of Quebec, for the purpose of making laboratory tests. When the tests are completed the results will be given in a report.

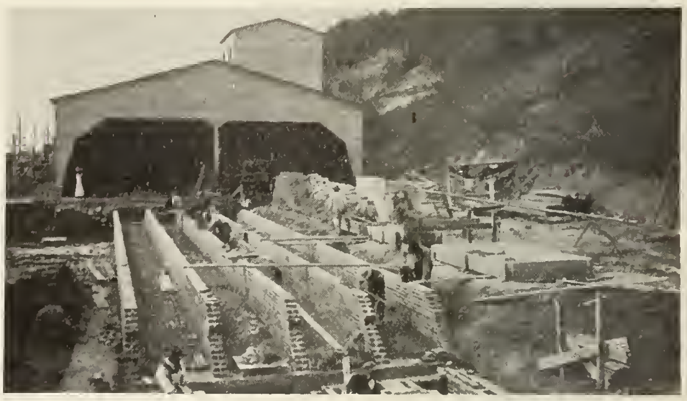


Fig. 7—Plant under construction for the Citadel Brick & Paving Block Company, Boischatel, Que. Foundation of driers in foreground.

When clay manufacturers wake up and realize that their business is to sell their products as well as to make them; when they spend as much time and effort in educating the people of their community as to the practical advantages gained by the use of burned clay, as they now do studying up how they can beat their competitors; and when they advertise themselves and their wares till there is not a man, woman or child in the community who doesn't know all about their product—then, and not until then, will clay products come into its own.

Waste dump of shale at Welton's mine, N. B.

New Brunswick Shales for Clay Products

THE Grand Lake coal area in New Brunswick contains several beds of shales and clays, suitable for the manufacture of a wide range of clay products. The complete section of middle carboniferous rocks exposed at Minto, includes about 90 feet in thickness of sandstones, shales and clays. The products that can be made here include red and buff bricks, fireproofing, sewerpipe, electrical conduits, stove linings and fire bricks. This is the nearest locality to Montreal in Canada at which material of this kind is found.

There is only one seam of coal in the district. This averages 20 inches in thickness, and is found at a depth of 50 or 60 feet from the surface. About three feet of fine grained shale is removed from the top of the coal seam during mining operations, and is piled as waste dumps near the various mines. This shale when pulverized to pass a 20-mesh screen, develops good plasticity when tempered with water. Tests made of waste shale from two mines show that it could be worked up for sewer pipe.

The underclay at the Rothwell Coal Company's mine at Minto is a fairly refractory buff burning material and could be used for boiler setting blocks, or face brick in buildings. The underclay at Flower Cove is more refractory still, and will make a low grade fire brick.

Hitherto the only outlet from this field was to the east by the New Brunswick Coal and Railway Company's line. This line is now extended to Fredericton, a distance of 25 miles, so that transportation toward the west is open.

The New Brunswick Syndicate have lately acquired two large areas of coal land near Minto. This company at present confine their operations to mining coal, but they expect to utilize their shale waste for the manufacture of clay wares, and will probably open up other shale beds for this purpose. They state that freight rates will enable them to lay down clay products at a profit, as far west as Winnipeg.

Waste dumps of shale at Rothwell Coal Company's mine, Minto, N. B.

Build with Brick

THERE is hardly a better feature line or slogan that one can use in advertising and boosting brick, says an exchange, than the headline given above—"Build with Brick." It has the euphony, enough alliteration to make it catchy, and it goes straight to the point of interest. It carries quite a lot of the power of suggestion right along with it, and if one will use pictures of neat attractive houses that have been built with brick it will materially strengthen the suggestive feature.

This power of suggestion is a mighty strong and useful one, too, that never grows old nor loses its power if it is handled right, with enough changes to keep it from growing tiresome. Pictures of houses made of brick not only suggest this material for building as well as specific designs, but they serve an educational purpose within themselves if they are varied enough. For example, a prospective builder was asking advice about what kind of material to build with. In this case it was a woman, and she wanted a sort of bungalow type of house, about one and a half storeys high in the walls, so as to get a couple of bedrooms upstairs. She confessed to an admiration for brick, but was wondering whether or not brick would look well in a house of that type. It seems that some one had told her it would not—some carpenter or lumberman, perhaps—and left her with the idea that brick shows up best in large buildings.

It is prospective builders like this that the "Build with Brick" slogan, accompanied with varied pictures showing different types of houses, would have an educational effect on, as well as carry the power of suggestion that they build with brick. And if special circulars, showing not only designs, but actual colors, too, the effect should be even stronger.

Anyway, all the time the idea to keep in mind, for personal talks as well as for the printed words of advertising, is to build with brick. Be prepared to give specific answers to questions about it, and everything else one may want to ask. They are the things that will help get the business after the prospective builder is once interested and then each new building that is good will help some to get others if you make the most of your opportunities.

The Standard Brick Co., Toronto, have installed a modern device for conveying green brick upon pallets from the press to the dryer. This gravity carrier is similar to those used in canning factories, breweries, etc., for handling boxes, and consists of steel ball-bearing wheels upon parallel bars set at a grade of three per cent. (3 ft. fall in 100). Any smooth article placed thereon will travel of its own weight any distance either in a straight line or around curves. In the manufacture of brick such carriers are found to be very economical. In this installation the pellats with the brick are sent from the press to the dry kiln and the pellats are returned to the presses. The saving in room necessary for trucks, labor, etc., is therefore considerable.

The Development of the Sand-Lime Brick

Manufacturing Processes: Slaking, Mixing, Pressing and Curing Chemical Combinations—Crushing and Absorption Tests

By Peter Gillespie, Associate Professor of Applied Mechanics, University of Toronto

THE sand lime brick as we know it to-day is historically a development of the sand brick with the calcium carbonate filler which, as early as two generations ago, was manufactured in America and in Europe. In the second Report of the Geological Survey of the State of New Jersey, 1856, Mr. G. W. Cook refers in the following paragraph to a process of manufacture of bricks of this class and intimates that the industry was known in that state as early as 1838:

"A new building material has been introduced in Cumberland and some of the adjoining counties, which promises to be both cheap and durable. The common clean gravel and coarse sand of the country is mixed with one twelfth its measure of stone lime and made into bricks. These bricks are sun-dried and then laid up into walls. They are cheap, durable and but little affected by the changes of the seasons."

Chemically, and to a large extent practically, this brick was identical with common lime mortar which, as is well known, consists of slaked fat lime and sand mixed in certain proportions. The lime, as the chemists explain, abstracts from the atmosphere the carbonic acid gas which the latter contains and is thereby transformed into the carbonate. Reliable authorities assert that in very old mortars, not more than thirty per cent. of the lime is ever recarbonized. Obviously, the portion so converted in either mortar or the type of brick referred to, will be mainly that exposed to the atmosphere. These mortar bricks were made by mixing sand with from twenty to forty per cent. of completely slaked lime, adding sufficient water to render moulding possible and then compressing into moulds under moderate pressure. The brick were then exposed to the air for a long time or were confined in an atmosphere rich in CO^2 without pressure or in one of CO^2 under pressure. The last two methods were later developments and were supposed to accomplish the recarbonization of the lime much more rapidly than would occur with the first process. Of the third it was supposed that, owing to the pressure, nearly all of the lime was converted into the carbonate. This last phenomenon does not seem to have ever been proven. So far as is known, there is no chemical union between the lime and the sand.

A transition stage in the development of the sand-lime brick of to-day is that marked by the sand brick with a filler composed partly of carbonate and partly of silicate of calcium. In its manufacture the preliminary processes are those already described, but the hardening was accomplished in a warm moist atmosphere saturated with carbonic acid gas. Usually the CO^2 was obtained from the lime kilns and the heat of slaking was utilized to stimulate the chemical action. This combined treatment had two effects, viz., the conversion of a portion of the lime into carbonate through the absorption of carbonic acid gas, and the chemical union of a portion of the lime and part of the silica of the sand, resulting in a hydro-silicate of calcium. It is pretty generally conceded that a product has less strength than one in which there is a chemical union of the two ingredients, such as occurs when the calcium silicate is produced. In consequence, the tendency of recent years has been to develop the latter rather than the former. The sand-lime brick where a portion of the sand and lime have been induced to combine chemically into a silicate of calcium and where this constitutes practically the only bonding material is probably the only one which to-day has a real commercial significance and is the one always referred to when the common designation is used.

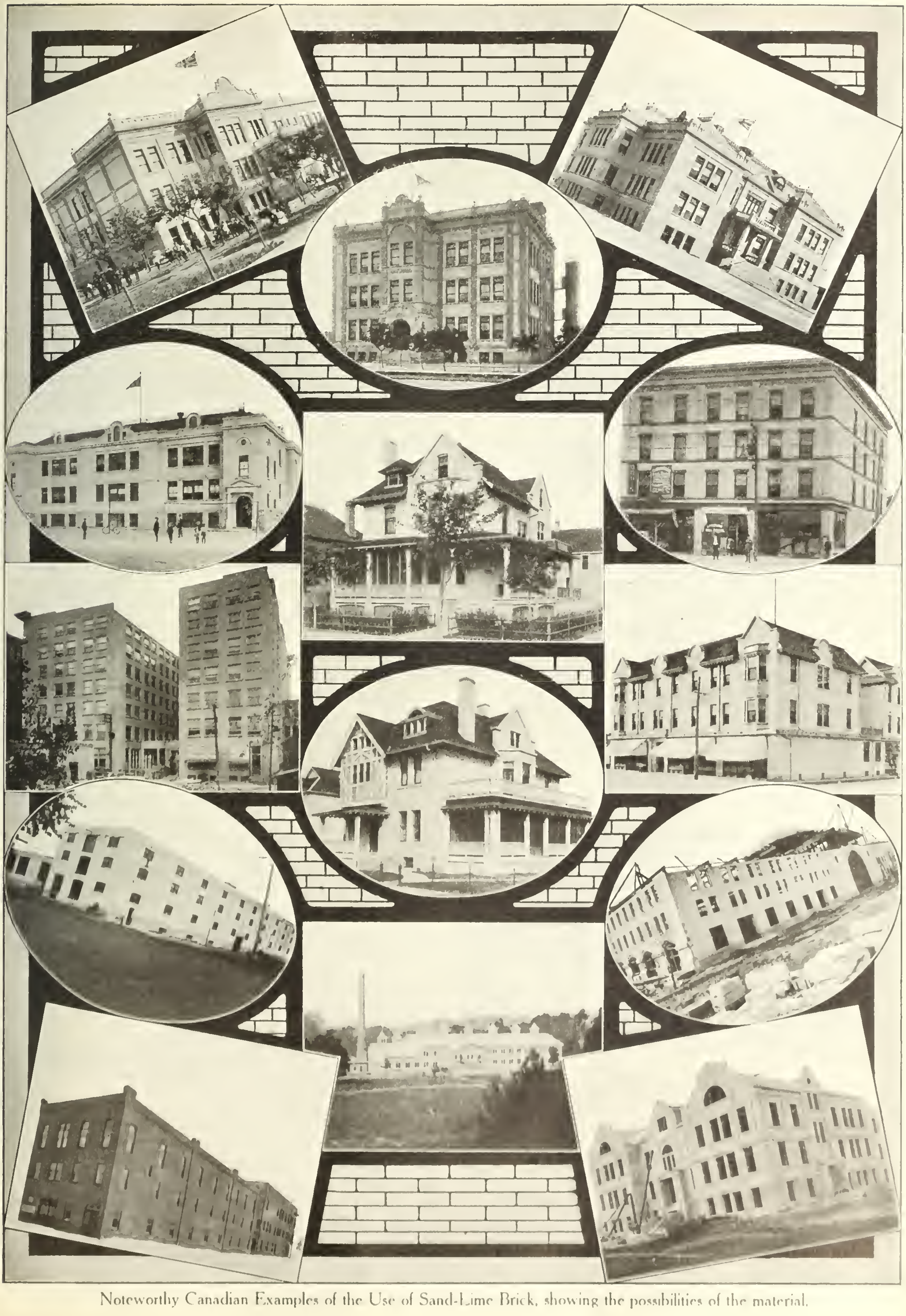
The steps in the process are four in number, viz., the slaking of the lime, the mixing of the lime and sand, the pressing into moulds and the curing. In some plants, the order is scarcely that indicated, but the processes are essentially the same in all.

The lime should be properly burnt and as little as possible of the crystalline oxide should be present since the latter hydrates with difficulty and thereby complicates the slaking. The lime should also be free from such impurities as silica and alumina. Experience seems to favor the "fat" limes in preference to the dolomitic limes, probably because the latter require more care and time in the slaking. Iron oxide is objectionable because of the color. It is believed also that dolomitic lime gives a brick slightly lower in its fire-resisting properties than one made from fat limes, especially if the amount of lime used is large.

The sand should as nearly as possible be a pure silica, preferably with grains of graded size, all of which should pass a twenty-mesh sieve. That a fairly large proportion of very fine grains affords a decided advantage when the subsequent union of the silica and the lime is about to be accomplished, has been conclusively demonstrated by Professor Gasenopp, of the University of Riga. Dr. Michaelis asserts that two-thirds of coarse sand and one-third of fine give a denser and firmer brick, other things being equal, than where the sand is all of one size. Clay in sand is always objectionable, since, unless an excessive quantity of lime be employed, it impairs the strength of the brick. For each part of clay present, it is common practice to add a little less than one part of lime in excess of that which would have been needed for the sand itself.

Preparatory processes, according to S. V. Peppel, are classified as the wet slaking method, the dry slaking method, the acid slaking method and the quick lime or oxide method.

In the wet slaking process, the lime is slaked to a putty either by hand or mechanically, after which sand, necessary to effect the proper dilution, and water are added. The mixing is accomplished in a pug-mill or wet pan, after which the mix is transferred to bins above the presses. This process insures a very finely divided hydrated lime due to the disintegrating effect of the steam generated through evolution of heat. In the cases where a dolomitic lime is employed, the action is less rapid, since the magnesium carbonate, being less refractory than the calcium carbonate, is likely to have been somewhat overburned in the making. In addition, the heat evolved is considerably less in the latter than in the former. The slaking process



Noteworthy Canadian Examples of the Use of Sand-Lime Brick, showing the possibilities of the material.

is occasionally stimulated by the application of external heat.

In the dry slaking process, only sufficient water is added to the lime to produce a dry hydrate. Sometimes the slaking is done in open and sometimes in closed vessels with water and steam under pressure. At other times, the action is aided through carrying on the slaking in a steam-jacketed vessel, sufficient water to accomplish the hydration having been previously added to the lime.

The use of acid in the slaking process is a third method, possessing the alleged advantage that it accelerates the action and lessens the time subsequently required for hardening. The acid used is commercial hydrochloric and is added to the lime in small quantity after the slaking has begun. The action of the acid on the lime is to produce deliquescent calcium chloride, a material whose affinity for water is well known. Concerning the whole process, Mr. Peppel has this to say:

"The introduction of the acid must be objectionable at any rate, since if the $Ca\,Cl_2$ remains as such, it will be soluble later and give trouble. If it is decomposed and $Ca\,Si\,O_3$ formed, the acid liberated in the warm moist atmosphere must certainly attack the metal cylinders unless they are glazed with a silicate of some sort or lead-lined." The reaction of decomposition referred to is indicated in the equation

$$Ca\,Cl_2 + Si\,O_2 + H_2\,O = Ca\,Si\,O_3 + 2\,HCl$$

The Schwartz Process

In the quick-lime process the dry lime is mixed with the sand and sufficient water added to bring about the hydration. The Schwarz process is of this kind and is described as follows:—

"The first operation in the Schwarz process is the mixing of the sand and lime, which is done in a vacuum mixing machine. Briefly described, the machine consists of a steam-jacketed drum with interior rotary blades operated by suitable gearing outside and at one end. This drum, which has a capacity of about three tons of sand is filled by means of a funnel placed above it. When the drum is charged, the interior mixing blades are set in motion and the contents are heated by means of the steam jacket surrounding the drum. A vacuum pump attached to the apparatus removes the steam and air from the drum. When the sand has been properly dried the required quantity of finely pulverized lime is introduced into the drum through a special aperture and the mixture is again stirred and heated. The necessary quantity of moisture is then introduced into the drum in the form of water or steam by means of a pipe penetrating the interior of the drum. After wetting, the mixture continues to be stirred and heated during a sufficient time to allow a preliminary combination of the lime and sand to take place and produce a mixture with sufficient tenacity to permit of easy moulding."

The moulding is done in powerful presses. These should be capable of applying a pressure of two hundred tons or more to the surface of the brick and of course should be so constructed that they have a good margin of safety in case the pressure rises above that specified. This contingency, since it depends on the compressibility of the mix, is quite likely to occur. The mould should be of the hardest possible material, since the abrasive properties of the sand occasion rapid wear on all ordinary metals. In some types of machine, the moulding parts advance from below as well as from above. In others, the advance is from one direction only. On leaving the press, the bricks are very fragile and usually so soft that delicate handling on the part of the workmen is necessary in order to avoid marking.

The hardening is brought about by exposure to live steam under a substantial pressure. The moulded bricks are piled in open tiers on cars as they are taken from the presses. These cars when filled are run into the steaming cylinders. When a cylinder has been filled, it is closed and sealed and the steam under pressure admitted. The period of confinement varies from six to twelve hours, and the steam pressure from one hundred to five hundred pounds per square inch. It is a common practice to operate the presses during the day and to steam the day's run during the night following.

It has been generally held that in the process of hardening under steam pressure, the lime and the silica unite wholly or partially to form a silicate of calcium. Mr. E. C. Eckel in his "Cements, Limes and Plasters," p. 133, gives expression to a doubt concerning the validity of this claim, for he says: "No proofs have been presented that, in the course of sand-lime brick manufacture, any chemical combination takes place between the lime and the sand. It is undoubtedly true that the treatment with steam under pressure increases in some unexplained way the chemical activity of the slaked lime; but further than that one cannot go at present." In the Transactions of the American Ceramic Society, Vol. 13, 1911, there appears a report of a rather exhaustive investigation into the chemistry of sand-lime brick by Dr. T. R. Ernest, in which the above historic view is corroborated. Ernest procured chemically pure calcium oxide and silica, the former by burning pure marble, and the latter by precipitation, from sodium silicate or by crushing quartz or grinding Ottawa sand. For chemical analysis, the samples were made by mixing the materials in various proportions, adding water and then pouring into a metal dish. They come then steamed in an autoclave under pressures varying from 10 to 16 atmospheres. Subsequently by analysis (the uncombined ingredient having been previously removed by ordinary methods) the ratio of the $Ca\,O$ to the $Si\,O_2$ was determined. Singularly enough, this ratio is approximately unity varying from 1.30 for a maximum to .82 for a minimum. This fact suggested the presence of the metasilicate of calcium ($Ca\,Si\,O_3$) in predominating quantity since the ratio of lime to silica in that compound is one. The variations from the nominal ratio of unity were, however, greater than could be attributed to experimental error, and this suggested the presence of other silicates also. Without going into the detail of the discussion which is lengthy and technical, it will be sufficient to state the conclusions to which, in the opinion of the investigator, the evidence deduced seemed to lead. These conclusions were in part confirmed by Dr. Ernest with the aid of the compound microscope. They are:—

1. Sand-lime brick made from pure materials consist of sand grains cemented together by a bonding substance.

2. Aside from the calcium hydrate or carbonate that may be present, this bonding material consists of a mixture of at least two, and most likely three, calcium silicates, some of which are hydrated.

3. The bulk of this mixture of silicates is calcium metasilicate ($Ca\,Si\,O_3$ or $Ca\,Si\,O_3\,H_2\,O$).

4. Other silicates which must be present to some extent are calcium orthosilicate and calcium disilicate, the latter of which may contain one or more molecules of water of hydration.

Subjected to the standard physical tests, sand-lime brick will be found to behave well, or badly, depending on the character of the raw materials and the skill and care devoted to manufacture. The crushing strength, absorption and modulus of rupture in cross-bending are usually found. Less frequently the resistance to fire and frost are obtained. In order to give some idea as to the behaviour of various building materials under test, and to enable us to place the material under consideration in its relative place, the following table has been compiled somewhat at random from tests made at various times in the Strength of Materials Laboratory of the University of Toronto during the past eight or ten years.

Material	Crushing Strength Pds. per sq. in.	Absorption
Roman Stone	2,920	2.7
Sand Lime Brick	1,860	....
Sand Lime Brick	1,250	....
Vitrified Brick	12,800	4.4
Cement Brick	1,750	11.0
Pressed Brick	4,360	14.5
White Clay Brick	970	19.9
Paving Brick	11,300	0.4
Clay Brick	3,780	11.9
Clay Brick	1,670	14.9
Clay Brick	1,860	17.1
Clay Brick	4,640	22.7
Clay Brick	3,200	26.7
Sand Lime Brick	3,330	9.0
Sand Lime Brick	1,390	10.9
Sand Lime Brick	1,450	10.4
Sand Lime Brick	2,820	13.3
Sand Lime Brick	3,580	11.6
Limestone	22,300	....
Syenite Building Stone	14,100	....
Limestone	14,900	....
Concrete Block	1,170	....

Sand-lime brick, it will be seen, are comparable in strength and absorption with clay brick. The poorer grades, however, are fragile and require careful handling. Needless to say, any brick which grinds under the pressure of the thumb cannot commend itself to the careful builder, and yet bricks of this class have been manufactured and offered for sale. Fig. 1 illustrates this type. On the other hand, I have tested many sand-lime brick that have been homogeneous in texture and color, which retained their edges without spalling under ordinary handling and usage and whose strength and absorption have been entirely satisfactory. Figure 2 is an illustration of this type. After photographing, the bricks shown in figures 1 and 2 were tested in cross-breaking and crushing. The results are given:—

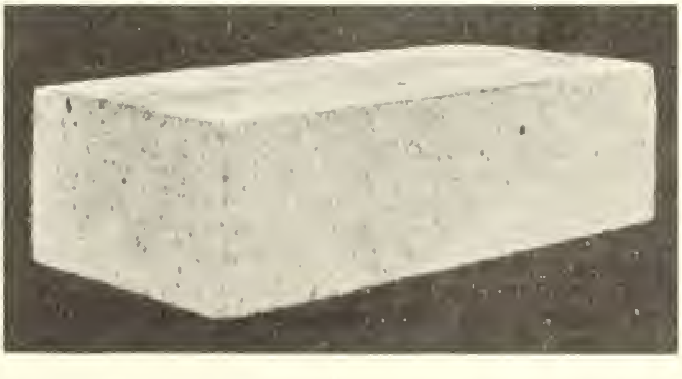
	Crushing Strength Pds. per sq. in.	Modulus of Rupture Pds. per sq. in.
1. (Fig. 1)	2,130	306
2. (Fig. 2)	4,160	674

The texture, solidity and ring were much superior in the second case than in the first. Some months ago I tested a sand-lime brick which developed the extraordinary crushing strength, 6,400 pds. per sq. in. This is the highest value I have obtained. The absorption in sand-lime brick, speaking generally, is less than that for common clay bricks, but exceeds that for vitrified brick and pavers. Eckel gives the following summary of absorption and crushing tests on German and American sand lime bricks:

	Strength, pds. per sq. in.			Absorption, per cent.		
	Max.	Min.	Aver.	Max.	Min.	Aver.
10 American Tests ...	4162	2079	3393	12.4	2.27	8.89
8 German Tests	4189	850	2118	18.3	9.0	12.78

In the Engineering News, issue of June 14, 1906, is an article descriptive of tests on the strength and fire resisting qualities of sand-lime brick by Professor Woolson of Columbia University, New York. In addition to giving in detail the results of many experiments on their physical properties, he describes a fire test conducted in the fire testing station of Columbia University in which the comparative merits of clay and sand-lime brick were investigated. "The house is 14 ft. 6 in. by 9 ft. 6 in. on the outside and consists of reinforced concrete walls and roof, while the side walls are removable. The floor of the building is a grate upon which the fire is built and suitable draft openings and chimneys are provided. The sides were built in as 8-inch walls with sand-lime brick for one, and common brick for the other. The work was done by regular brick masons who were instructed to make the wall "a good average job—no better."

The fire was gradually brought during the first half hour up to a temperature of 1700 deg. F., which temperature was maintained an additional hour and a half. At the expiration of this time, a 1⅛ in. stream of cold water was applied at hydrant pressure for three consecutive minutes. The various panels were designated by the letters of the alphabet. The results as reported by Professor Woolson are given.



Sand Lime Brick

A.—Appeared in good condition in wall, but were found very soft and tender on removal.

B.—Practically same as A. Two brick were spalled off by water ⅛ in. deep.

C.—Somewhat wasted by water, particularly along lamination crack at middle. Badly cracked on surface, but whole bricks could readily be obtained.

D.—Surface washed away by water on about half the bricks. Bricks were tender and broke easily in several places. Difficult to get whole brick.

E.—Surface badly washed by water to a depth of ¼-in. to ½-in. Tender and easily broken.

F.—These bricks contained many quartz pebbles ½ in. or more in diameter. These pebbles burst on the surface and tore away the brick. General appearance bad. Many cracks.

G.—Surface little wasted by water, but brick in very good condition. Whole brick easily obtained. Few cracks.

H.—Few cracks; good condition.

Clay Brick

I.—Full of cracks. Very difficult to get whole bricks.

I—Many pieces spalled off by water. Bricks very badly cracked in wall. Could not secure a whole brick. Poorest of clay bricks.

J.—These "salmon" brick seemed to withstand the fire the best of the clay bricks. However, a large percentage of them showed cracks.

K.—Badly chipped and cracked. Whole brick very difficult to secure.

L.—Same as K.

The transverse strength was extremely low in all the brick, but the compressive strength was very much higher in proportion. The strength of the clay brick was a little superior to the sand-lime in transverse, but at best they were bad. No advantage was evident in compression.

Experiments by Dr. T. R. Ernest, reported in the Transactions of the American Ceramic Society, Vol. 12, 1910, in general confirm the findings of Professor Woolson as regards the cross-bending and crushing. In this connection, Dr. Ernest says: "In any final conclusion as to the relative merits of sand-lime as compared with other brick, it must be remembered that strength is but one of the many properties to be considered, and that in the matters of conductivity, shrinkage, coefficient of expansion, warping, etc., sand-lime is in a class by itself."

It is difficult to be dogmatic as to the future of this industry, but much certainly depends on the manufacturers. Sand-lime brick if properly made and if of uniform quality will undoubtedly find a market. At the present time it seems as though gray is not a popular color in brick, but in what field is popular taste more fickle? Attempts to use pigments have not been very successful and incidentally they increase the cost. Moreover, the popular color of to-day may not be esteemed to-morrow. In this vicinity sand-lime brick are quite largely used as fillers, but to a much less extent as face brick. The color has doubtless had something to do with this, but the quality has had more. Possibly because of the phenomenal activity in building operations of the present day, manufacturers may have been tempted to place output ahead of quality, which in consequence has often been inferior. If the manufacturer will produce as strong, as durable, in short, as good a brick as the clay brick, which for generations has stood the test of time, there will be no doubt as to sales or profits or ultimate satisfaction. The business is offering; the product can be produced. Will the manufacturer rise to the occasion?

Greenshields & Company, of Montreal, who were responsible for the financing of the National Brick Company of Laprairie, are behind the Ontario National Brick Company, which will construct at Cooksville a plant of a capacity of 60,000,000 bricks per annum. The contract for the work has been let to the P. Lyall & Sons Construction Company. The plant will be run by electricity, while gas will be used in the kilns. The land has an area of 104 acres, and Mr. McArthur states that the shale is of a very superior quality and plastic nature; it is, in fact, much softer and easier to grind and manufacture than the shale of Laprairie and Delson.

Why Bricks Discolor

French Scientist Gives New Views on Problem of Efflorescence of Clay Products

THE causes of irregular whitish spots which frequently appear on brick, after exposure to the weather, have been discussed frequently with apparently no definite conclusion as to the cause or cure of them. The following, translated from the "Revue Scientifique" may shed some light on the matter, or at any rate, it will give another man's view of the matter.

"Owing to their lightness, convenience, and ease of handling and to the extreme variety of the decorative effects that their use makes possible, brick have assumed considerable importance in modern construction. Unfortunately, the appearance of the facades in which they constitute the principal material is often injured by saline efflorescences forming brownish or yellowish patches. The solidity of the walls is at the same time affected because the crystallization of the efflorescence salts not only favors the disintegration of the brick, whose pores they enter, but also determines moist areas that soften the mortar of the joints and facilitate the scaling of the paint.

"Similar efflorescence also appears on brick before using, notably while drying, and this is sometimes the cause of loss to the manufacturers, who are obliged to abandon the clay deposits on which they are at work, or sell their brick at less than cost.

"These annoying deposits have been studied for a long time. It is known that they are formed by a layer of soluble salts that the water has brought from within to the outside of the brick, and which have crystallized, on contact with the air, by simple evaporation of the liquid that has held them in solution. For the most part, these salts are sulphates of potassium, sodium, alumium, magnesium, and particularly of lime; the latter, though not very soluble, makes the most abundant efflorescence and the least easily washed away by rain. But we find also constantly chlorides and carbonates, chiefly of potassium and sodium. It would seem then that the presence of soluble salts in the substances used must be the indispensable condition to the appearance of the phenomenon. Nevertheless, it has been shown that certain efflorescences are made up of pure sodium carbonate, though neither the brick nor the water, nor the mortar used, contained the slightest trace of this salt. It is supposed that in this case . . .there is a chemical reaction between common salt in the water used and the lime of the mortar. But in most cases these salts pre-exist, fully formed, either in the clay used in brickmaking, or in the water, or in the mortar; sometimes, also, they may result from oxidation in the burning or from the action of sulphurous gases in the furnace.

"It has been hoped to eliminate these salts by simply washing the clay, but this is always expensive and sometimes spoils the material, the usual practice being to expose it to the rain, which contains acids that render soluble and insoluble salts in the clay, thus making matters worse. A better plan is to use none but the best quality of clay in brick-making, and the finest mortar in putting the bricks together.

"As for existing deposits, they can easily be caused to disappear by washing, either with pure water, or, if this fails, with slightly acidulated water. The information given above should be in the possession of all persons in the building trades, who will find frequent occasion to make use of it."

Electricity in the Brick Plant

By Chas. A. Millar[*], Toronto

FROM the days of bondage when the children of Israel served the Egyptians as slaves and manufactured brick "without straw" down to the present day is a long span as we reckon time. Doubtless in all these thousands of years there has been continuous improvement in the brick industry, but to those who are in the forefront to-day there would seem to have been more advance during the last twenty-five years than in all preceding ages. A few years ago the business of the brick manufacturer was a "side line" to which he devoted himself only for a few months in the summer. Now in the day of artificial drying we work twelve months in the year—and that is all too short.

We are living in the greatest country under the sun, whose expansion in every department of trade is the wonder and admiration of the world, and as clay workers we have "reluctantly" fallen into line because we have had no alternative. Occasionally when travelling by rail one still sees the horse on his weary round turning the wheels of a machine, but in most places the horse has given place to more up-to-date power. We are living in a swift age and as speed is what counts now so the lightning has been harnessed to do our work. As to the efficiency of electric power we shall have something to say.

There are very few places to-day where electric power cannot be obtained and the installation of a motor is a simple process involving only a few hours' work. And then what? That all depends upon what you want done. Is it to drive your pug mill and brick machine? A 4 h.p. motor will do it every working day in the year and never turn a hair. Is it to run your fan or clay car? It is on the job at a moment's notice or off again in the same time. Is it reliable? Well, a straight run of thirty-six months with less than 90 minutes' lost time is not a bad record, is it? Some one may ask: "And who is to look after my motors after they are installed? I am no electrician." They look after themselves—a little oil occasionally, a small bellows to blow out the dust once in a while, and your pallett boy to turn the switch are all that is necessary. Our average price per M. for all power used for a year was 17¼ cents and it will doubtless be less this year. Electricity is the one perfect power for manufacturing to-day—reliable, even, steady and always ready night or day.

Have you ever had to bite your tongue to keep from swearing as you looked in vain, after starting time, for the engineer to show up? There are none of these experiences in the eletrically equipped plant. As to its safety, there is very little danger when properly installed, and while electricity is used across the border for putting criminals to death, it is a real tonic if taken in small doses. When all has been said about the work that electricity will accomplish there are fields of usefulness of which we have not yet dreamed. We may yet see the day when waste heat dryers and coal burnt kilns will give place to better methods—when it will only be necessary for us to touch a button to obtain sufficient heat for whatever purpose may be required.

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[*] President and Manager of Price's, Limited.

For Discoloration

AN exchange offers the following remedy: "When red brick of a fireplace become discolored with soot or have white spots on them, rub with a brick polish, the paste for which can be obtained at a brickyard or paint-shop. If this cannot be found, rub the bricks with linseed oil, giving them all they will absorb. This treatment may be repeated if the bricks are much discolored."

The Outside Equipment

THE fall, winter and spring season is the hard time on the outdoor equipment of the clay plant. For this reason, says the Clay-Worker, sometimes one feels that part of the equipment deteriorates from exposure more than it wears out. Clay handling and working is of itself hard enough on machinery equipment, wears it out more rapidly perhaps than anything else but stone and cement working.

That machinery which is under shelter, though, is protected from the elements and, with proper care, will last much longer doing the same amount of service than the outside equipment.

The natural inference from this is that the best thing to do with outside equipment is to keep it inside as much as possible. That is, provide housing for as much of it as practical and protect it in every possible way from the weather.

Then after protecting with shedding as much as possible there is another line of protection that should be followed up faithfully, beginning in the early fall, and that is the protection of metal, wooden parts of cars, and other outdoor equipment with paint. Clean thoroughly, overhaul, and paint everything. Do not do it hastily or carelessly or without any proper deliberation. Make a study of paints, those particularly adapted for certain purposes, get what seems to be best for the metal and what seems to be best for the wood and see that the outside equipment is kept coated with it.

Paint is the greatest protecting material in the world that we have in common use and it has to be renewed repeatedly to get the best use out of it. Where one discontinues operations at the clay bank in the winter it is a good plan to get the equipment under shelter in some way and spend part of the winter months thoroughly overhauling. Do this work, too, immediately after discontinuing operation. Do not let it stand and rust with the dirt and moisture attached to it, but make this clean-up the first order of business. Clean everything thoroughly, make what repairs are necessary, and use paint and oil liberally as a protection against rust and keep the equipment in good order and ready for immediate use when operations are begun in the spring.

If the equipment is used right through the winter it should be attended to anyway, either by stopping a week or two for general overhauling of this kind or by taking a part of the equipment at a time, cleaning it, letting it dry, and going over it thoroughly with paint and at the same time making whatever repairs are necessary.

It is some trouble and expense to take precautions of this kind but it saves expense in the way of repairs and new equipment that is worth while. By proper care one may prolong the life of this outdoor equipment and keep its usefulness up to the highest standard. It, therefore, becomes a duty not to be neglected and the sooner it is looked after in the winter season the better one feels about it and the better are the results generally.

Piece-Work and Day-Work Compared

By W. H. Freeborn[*]

IN the following brief article I propose to make a comparison of piece-work with day-work, in its particular reference to the clay industry. At the outset I may say that I am in favor of piece-work where conditions are favorable. For the last twenty-five years I have operated both brick and tile plants and after a careful study of the question I have come to the conclusion that where it is possible, piece-work is more satisfactory not only to the employer but to the employee.

The first consideration in the question is the kind of workman encountered in this field. We have the honest workman, who is sober, steady, industrious and always on time. This man is full of energy and always ready to take advantage of an opportunity to further the interests of his employer. On the other hand there is the shiftless workman, careless and indifferent, who works only when circumstances compel him and who stays with the job only long enough to suit his own needs or as long as his employer can bear with him. It is the better class of workmen that is attracted by piece-work and surely the better system is that which attracts the better man. As a piece-worker an employee feels that he has something to work for. He is in fact working for himself. The harder he works the more money he makes and so he acquires a personal interest in the success of his employer's business. It has been my experience that where piece-work can be adopted successfully the standard of the men will be raised as well as the general prestige of the firm.

In some cases the workman is loth to leave the day-work system owing to lack of confidence in himself and to the idea that he may be exchanging a certainty for an uncertainty. Here the employer will be well advised to make a careful explanation, for it is essential that there be perfect confidence between employer and employee.

If good records and good pay are being made under piece-work the prices should not be cut down unless for a substantial reason. Otherwise the good name of the industry will suffer. I have operated one brick plant for twelve years and have been able to retain the services of practical men year after year by giving them a fair rate and by treating them reasonably, yet never allowing inferior brick to pass. And this is why piece-work appeals to me: because it affords the opportunity to retain the services of practical men. When your skilled workman leaves you there is all the trouble incidental to the training of a new man, and this is no small matter in the brick industry. Much of this unprofitable experience is avoided where a fair piece-rate obtains. The better class of men stay with their jobs and they have some reason to think that you appreciate their services. Piece-work keeps the machinery in constant operation and means the maximum output. The best possible results obtain during working hours—effecting the best economy. Under this system, also, the hours of labor are shortened. Piece-workers generally complete their tasks in an eight or nine-hour day, as compared with a ten-hour day common to day-workers. Further, in these days, when the men are looking for better treatment from their employers, there is less chance of dispute.

The last point that I would bring forward in favor of piece-work is that it has a tendency to lessen the cost of production. The firm that is producing brick at a certain fixed price is better able to arrive at the actual cost of its product. An intimate knowledge of the cost of operating his plant from day to day is a strong point for the employer.

While I have submitted an argument in favor of piece-work I can only say, in closing, that the system adopted must be chosen carefully to suit the particular conditions. A system which promotes good feeling between employer and employee and which gives the workman a chance to earn what he is worth is the preferable one. It is not a case of a fixed principle, for what may work in one place would possibly be a failure in another. Local conditions, and the interests of the business, the employer and the employee must be weighed carefully.

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[*] President Canadian Clay Products Manufacturers' Association.

Frequent Tests Necessary

THE paving brick manufacturer should make frequent tests of his brick, from every kiln or every carload shipped, that he may know whether he is producing brick that meet the specifications. Moreover, by having a standard rattler at his factory, he can improve his product by testing the effect of all changes in materials, in methods of preparation, in making or repressing and in drying or burning.—Standard Test of Paving Brick.

A somewhat novel use of ferro-concrete is represented by the two ventilation shafts recently built at the new slaughter-houses for the Glasgow Corporation. The shafts are 45 ft. high by 2 ft. 9 in. square inside, from top to bottom. The sides are 4 in. thick at the bottom and 3 in. thick at the top, the concrete being reinforced by thin rods disposed horizontally and vertically every few inches.

Suplementary Report of the Toronto Convention of Sand-Lime Manufacturers

MUCH interesting work was enacted at the 9th annual convention of the American Association of Manufacturers of Sand-Lime Products—now known as the Sand-Lime Brick Association. An advance report of this meeting was published on page 39 of our issue of December 11.

One of the valuable papers presented at the meeting was an address on the Testing of Sand-Lime Brick, by Mr. Warren Emley, a representative of the United States Bureau of Standards. Mr. Emley's remarks were well received. His research work has been of great value to the members of the Association and his observations at this meeting were of a practical kind looking to an improved standard of manufacture for the industry. It is to be regretted that Mr. Emley's paper is not available for this issue. We understand that the paper will be retained for exclusive publication in the records of the Association. The papers by Mr. P. L. Simpson and Mr. W. H. Crume, to which reference was made in our last number, will, it is hoped, appear in a future issue of this journal.

One of the features of the convention was the inspection tour made on Wednesday, December 4. The members were the guests of the Toronto and Harbor Brick Companies and of the Berg Machinery Company. Motor cars conveyed them first to the plant of the Harbor Brick Company, where a favorable impression was received of the methods of manufacturing sand-lime brick. The members appreciated the results in output, the product being marketed right up to the production. The next point of interest was the plant of the Berg Machinery Company. Here the members paid particular attention to the up-to-date machinery and methods of manufacture. The party then proceeded to the Toronto Brick Company's plant at Swansea and afterwards to that of the Toronto Brick Company, at Scarboro.

The election of officers was contained in our former report. Mr. F. B. Allen, of Toronto, becomes vice-president of the Association, and Mr. G. Silvester, of Calgary, is a member of the executive committee representing the Canadian division of the Association.

The following is a list of the members of the Association represented at this meeting:

Paragon Plaster Company, Messrs. W. K. Squire and W. H. Boggs; Crume Brick Company, Mr. W. H. Crume; Rochester Composite Brick Company, Messrs. M. W. Burchfield and Homer Knapp; Manufacturing Equipment Company, Mr. Charles Stevenson; Harbor Brick Company, Messrs. H. W. Terry and Harry Burnsides; Bird's Hill Sand-Lime Brick Company, Messrs. D. D. Wood and F. A. Clary; Winnipeg Sand-lime Brick Company, Mr. W. D. McFarlane; F. Komnick, Elbing, Germany, Mr. Paul Jaxt; Acme Brick Company, Messrs. Irwin Toepper and Wm. Moder; Lehigh Car Wheel & Axle Company, Mr. H. C. Shields; Hummelston Brownstone Company, Messrs. S. O. Goho and A. K. Walton; Buffalo Sandstone Brick Company, Mr. W. E. Plummer, Jr.; Berg Machinery Company, Messrs. A. Berg, John Berg, Chas. Berg and Robert Bertram; Calgary Silicate Pressed Brick Company, Mr. G. Silvester; John Mann Brick Company, Messrs. Fred Mann and Edmund Horley; American Clay Machinery Company, Messrs. L. W. Penfield, P. L. Simpson, C. J. Carmichael, and W. H. Merkel; Saginaw Brick Company, Mr. Jno. L. Jackson; Jackson & Church Brick Company, Mr. E. D. Church; Belt Line Brick Company, Mr. J. Jellie; Grande Brick Company, Mr. H. O. Joseph; Toronto Brick Company, Messrs. F. B. Allen, L. E. Prosser, H. Race and R. A. Callan.

Brick Building at St. John for Footwear Interests

WHEN the Ames Holden and McCready footwear interests were amalgamated in the spring of 1911, under the name of Ames-Holden-McCready, Limited, it became necessary to secure larger premises both east and west, for the proper conduct of the amalgamated business. The company therefore built a large warehouse of their own in Edmonton, of which they have lately taken possession. Having faith in the forward movement in the Maritime Provinces, and believing that they would be justified in building there also, the company selected a site in St. John for a building to be their headquarters for these provinces. This building has just been completed. It is located at the corner of Canterbury and Duke streets, in the business section, close to the customs house and post-office. The structure is 100 x 50 ft., five storeys and basement, and is described by one of the underwriters as the best sample of a fireproof warehouse in the city of St. John. The foundation is of concrete, and the structure of brick. In order to get a basement it was necessary to drill and blast out the solid rock. There is a tradition that a spring once existed just across the street, and to ensure an absolutely dry basement the outside of the concrete foundation was covered with a waterproof substance, and a waterproof cement was laid over the concrete floor. The building is of mill construction throughout and built right up to the requirements of the fire underwriters. The elevator and stairway are in a brick tower which is carried up through the roof. The offices and sample rooms are finished in cypress, being panelled in fine grained wood. The whole building is laid out for the most convenient storing and handling of goods, with a different brand of the company's product on each floor, which is specially laid out for handling it with facility. The architect of this building was Mr. F. Neil Brodie, of St. John, and it was erected by local contractors. It is one of a group of fine buildings that have been erected in St. John this year.

Ames-Holden-McCready headquarters at St. John, N. B.

The Use of Architectural Terra Cotta

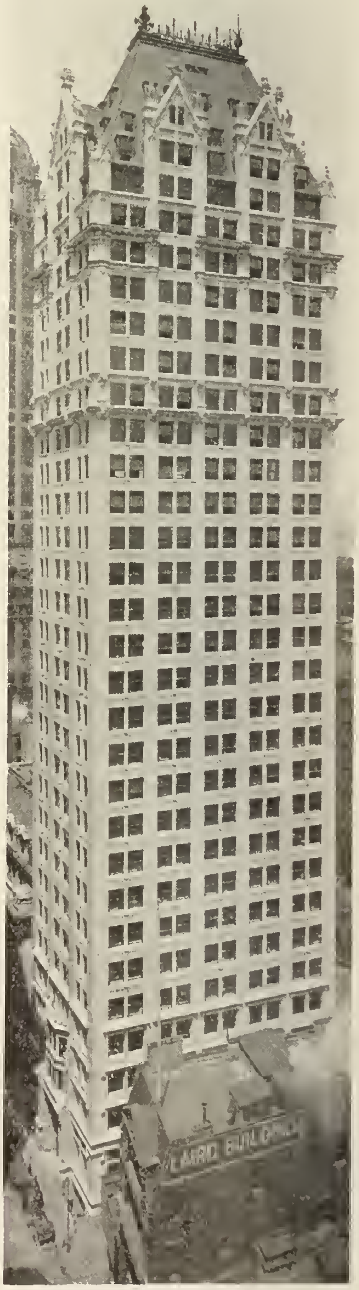
Structural Efficiency and Possibilities in Exterior Decoration—Physical Composition and Method of Manufacture

ARCHITECTURAL terra cotta is not a new material in the building world. On the contrary, it is probably the oldest known manufactured structural material. We still have examples that date back over four thousand years.

Its present-day efficiency, however, is a matter of comparatively recent development. In fact, giant strides have been made in the past ten years, both in the structural efficiency and its decorative possibilities.

The Woolworth Building, just completed in New York, may be accepted as an illustration of its full advantages for exterior construction and decoration. This building rises 789 feet from the sidewalk and 52 of the 55 storeys are entirely Atlantic Architectural Terra Cotta on all elevations. The shaft is a cream matt glaze with slight variation that gives light and life to the facade; the panels between the window courses are modelled in buff against a background of blue, green, golden yellow and sienna; all the ornamental features are intricately modelled in gothic de-

Woolworth Building, New York—Mr. Cass Gilbert, Architect. Matt cream Architecural Terra Cotta from third storey to roof All modelled ornament treated with faience colors.



The Liberty Tower, New York White Architectural Terra Cotta from sidewalk to roof.

sign against backgrounds of color, and the high lights of some of the ornament are covered with a bright gold glaze. In the character of its design the Woolworth Building can be compared to the famous Gothic cathedrals of Europe, but while the cathedrals took decades, and in some cases, even more than a century to build, the erection of the Woolworth Building walls was a matter of about eight months.

It is strange that a building material of such present and potential importance should be practically unknown to the general public. Even architects and builders have very little understanding of what architectural terra cotta really is. For that reason the following description of its manufacture should be of particular interest. Written by an official of the largest terra cotta company in the world, it fully describes the various steps of the manipulation from clay bank to the finished product.

Window treatment of Woolworth Building at 29th storey

Flying Buttress at 42nd storey of Woolworth Building

To understand the various properties of Architectural Terra Cotta some idea of its physical composition and the method of manufacture is necessary. There are so many different elements that enter into its proper treatment at the facory end that the subject can be treated in a rather superficial way, only, in an article of this kind.

Physical Composition.—Primarily, terra cotta is a burnt clay product, but nothing could be further from the truth than the general misconception that it is similar to brick. Terra cotta is a mixture of anywhere from two to six different kinds of clay, each with certain properties of its own, added for a certain reason. To the mixture is added an amount of grit, or terra cotta previously burned and ground for the purpose. The component parts are thoroughly mixed by machinery with enough water to make the resulting body plastic, so that it may be easily worked.

The clays are carefully selected with regard to their burnt properties, the extent of shrinkage consequent upon evaporation of moisture, state of vitrification, porosity and color. They must be carefully considered and tested in their relation to each other; there must be clays that bind the component parts firmly together, and which—supplemented by the grit—prevent warping and too great a shrinkage during the process of drying and burning. The clay body must mature at the temperature determined by the point at which the glaze matures, and the co-efficients of contraction and expansion between the body and the covering slip or glaze must be adjusted to avoid crazing in the glaze. Ordinarily the temperature at which terra cotta is burned approximates 2300 deg. Fahrenheit. The average shrinkage of the body at this heat is one inch to the foot, and is more constant than would generally be supposed; inevitable slight variations are taken care of in a way to be explained later.

Drawing.—In the manufacture of terra cotta the first thing the manufacturer does is to make complete terra cotta construction plans in accordance with the architect's drawings. It is impossible that the architect should do this himself beyond a certain extent, for it requires years of practical experience in the manufacture of terra cotta, knowledge of the manufacturing methods of the factory in which the material is to be made, and intimate knowledge of the characteristics of that factory's product. For instance, all factories do not use the same shrinkage scale, and in some factories more than one shrinkage scale is used because different colors may require different temperatures, involving a different shrinkage. There are countless other points which must be considered; the shape of the piece, the relation between its dimensions, and the end upon which it is to be set in the kiln so that it will be certain to burn straight and shrink evenly, must be thought out carefully.

Terra cotta cannot be set on its face for the slip or glaze fluxes in burning and adheres firmly to anything with which it comes in contact. The glazed material requires particular care in this respect.

The method of anchoring to the form of frame construction the architect elects must be worked out in detail, and here again intimate knowledge of terra cotta is necessary. The drawings prepared by the manufacturer show the size of every anchor, its attachment to the piece with the necessary apertures, and the attachment to the frame. Complete iron schedules are compiled for the iron contractor's bid. The dimensions of the bond are given and its connection with the masonry or iron work. All joints are clearly shown, and they differ from stone joints in that allowance must be made for the possibility of uneven shrinkage. The better class of manufacturers always make entrance and lower storey work, where the joints will be prominent, larger than the necessary size to permit grinding the joints by machinery to mechanical exactness.

Entrance to Alwyn Court Apartments, New York—Messrs. Harde & Short, Architects. Showing the possibilities of intricate modelling in Architectural Terra Cotta.

The scale drawings are sent to the architect for approval, and on return full size drawings are made to shrinkage scale for the use of the modellers and moulders.

Models and Moulds.—When the terra cotta calls for ornament or figure design, the model is made in clay by hand. Sometimes the architect indicates roughly the style of ornament desired, and leaves it to the manufacturer to develop the design in detail. For this reason the manufacturer must maintain the highest quality of skilled labor in the modelling department; frequently the head of the department is a true sculptor in an original way, and he must be conversant with every style of architectural ornament as well. The mechanical models are made in plaster. A fully equipped photographic department, which the manufacturer must also maintain, prepares photographs of the models and the architect approves or revises the work from the photographs unless he prefers to inspect it personally. Even in a completed state the models are subject to his revision. When approval has been received, plaster moulds are made directly from the models, one for every piece of different design; and to expedite the work, or when a great many exactly similar pieces are required, two or more moulds are made. It will be readily seen that great economy in modelling results when a design is so arranged that the ornament frequently repeats.

Pressing.—In the moulds the terra cotta is pressed by hand. (It has proved impossible to use machinery satisfactorily for even the simplest class of work). The pressing does not require especially skilled labor, but every piece must also be finished by hand with modelling tools. In the case of intricate ornament it frequently takes as long to finish the piece as it does to press it, and the finisher must possess some knowledge of the essentials of modelling. A great many pieces can be made from one mould.

Drying.—Before the piece can be colored and burned, it must be thoroughly dried. This is necessarily a slow process at first. Fully one-half of the entire shrinkage takes place during drying, and unless this goes on gradually warping is inevitable, and warping started in drying almost invariably becomes more marked in burning. There is also danger of cracking if the heat is applied too soon. Drying is expedited by placing the material in artificially heated tunnels when the process is far enough advanced. The time required to dry a piece of average size is one week. In case of an unusually large piece with dimensions of unbalanced ratio the time must be doubled.

Spraying.—When the building is of one color the application of color is a comparatively simple matter. The slip in liquid form is sprayed on with an atomizer operated by compressed air. In the simplest colors from two to three coats of one slip are sufficient. The number of slips required varies from one to four—and even five in the more complex glazes.

In coloring polychrome material the method of application is the same, in general, except that it is a much more delicate operation and requires considerable skill on the part of the operator.

In the preparation of the various colors the highest kind of technical ceramic chemistry is required. There

The Bank of Toronto, Maisonneuve Branch, Montreal—Messrs. Hogel & Davis, Architects. Entirely of white matt Architectural Terra Cotta.

are no glazes on the market that are suitable for terra cotta and every factory must maintain its own ceramic chemical laboratory. The men at the head of these have in general obtained degrees from one of the best universities in the country that offer a ceramic chemical course, and in many instances have studied in Germany or England. At best, however, the theoretical knowledge obtained in this way serves only as a basis for experiments which must be adapted to local conditions, which not only are not alike in any two factories, but liable to change "without notice."

Burning.—The kilns in which terra cotta is burned are made with a double wall through which the heat circulates. The flames do not come into contact with the material; such contact would be absolutely ruinous. Even a small leak admitting gas into the inner chamber is disastrous. The fuel in general use is soft coal. The size of an average kiln is 18 feet diameter and 15 feet high, inside dimensions, with a double wall from three to five feet through. Such a kiln will hold from thirty-five to forty-five tons, burned weight. As the material is loaded, tiers are built of blocks and slabs of a fire-clay mixture, for terra cotta when it approaches maturity is too near the fluxing point to bear any great superimposed weight. The fire-clay body having been burned previously at a greater heat than that to which the terra cotta is subjected, is unaffected. Terra cotta reaches a temperature of about 2300 deg. Fahrenheit, and at that heat is white-hot and translucent. It is this process that makes it so absolutely fireproof.

Guaranteed Pure Milk Company's building at Montreal—Messrs. Hutchison, Wood & Miller, Architects. Entirely of white matt Architectural Terra Cotta with panel backgrounds in bright colors

It takes from twelve to fourteen days to "turn over" a kiln;—one day to load; five or six days of slow heating up to the required point; five or six days cooling, and one day to unload.

Fitting.—Before shipment all work is laid out in sections and carefully fitted. The better class of manufacturers, by making the pieces too large originally, are able to discount any small inequalities of shrinkage by grinding the joints on a steel rubbing bed, with a mechanically accurate result. This, of course, involves an extra expense, generally confined to the manufacturer. It is slight compared to the improvement in appearance.

Generally, extra pieces are made to take the place of any broken in kiln. If necessary, replacements are rushed through and burned in a small kiln to save time.

Shipping.—While terra cotta is a very strong material, and when properly set in a building easily stands any compression it is called upon to bear, it is brittle, and a sharp blow will chip it. Consequently, the greatest care is necessary when loading cars or barges. At the factory, terra cotta is packed in straw and firmly braced to prevent dislodgment, and it should receive equal consideration when it arrives at the building.*

Tile Kiln Floors

There is a vast diversity in the way tile kiln floors are made. Either there is no "best" way to make them or many manufacturers have not learned what is the best. These remarks, made by a writer in The Clayworker, refer to down-draft kilns.

If there is a best kind of floor for down-draft tile kilns we would all be benefited by using that kind.

A good floor is level, so that the setter can set tile down as fast as he can receive them, and the tile will set straight up and flat on the bottom. The air spaces will be of such size and properly distributed so that the heat will be evenly carried by the draft to all parts of the kiln. If one place burns too hard the spaces there should be reduced and the draft checked. If another place does not burn hard enough, the draft should be increased.

Tile can be set in a kiln with a permanent, level floor much faster and easier than where brick have to be set in the bottom to make flues for the draft. It is not profitable to be bothered with bringing and setting a few brick in the bottom of a kiln while a crew of men are on the job of setting the kiln with tile. Kiln floors should be built before time to set the kiln. Floor building and kiln setting are two distinct operations. Some kilns have solid floors and the tile are set with spaces between them to allow the draft to work towards draft holes in or near the floor.

This may be well enough when setting large tile on the floor, but small tile are apt to be unstable and tedious to set, especially if the floor is a little uneven. Besides, the spaces between the tile in the bottom course are lost and with a slotted floor could all have been filled with tile, thus increasing the amount burned at each time.

The objection has been advanced against slotted kiln floors with bench walls and tunnels under the slotted brick floor that the tunnels become filled and obstructed after several burnings and must be cleaned out and that the bench walls become staggered and rickety and must be rebuilt.

Experience has taught the writer that this cleaning and repairing can be done when there is no crew of men in waiting, and that it is a very small item compared with the losses attending the use of floors of other kinds that we have seen.

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* We are indebted to the Atlantic Terra Cotta Co., of New York, for the illustrations accompanying this article.

The value of a well-planned residential locality enhanced by brick paving

Brick Paved Highways

REPORTS from various points in Canada and throughout the United States show that more brick pavement was laid in 1912 than ever before and that even this record will be surpassed in 1913. The opinion is expressed that with the probable removal of the duty on paving brick more vitrified brick as a paving material will be used in Canada in the future.

It has been found in the United States that brick paved country highways only twelve feet wide have been fully able to take care of exceedingly heavy traffic between cities and towns. The most practical manner of building a brick-paved country highway is to place the pavement improvement on the heaviest trafficked side of the road, paralleling the brick with a road of natural earth. The curbs are laid flush with the brick.

Cuyahoga County, Ohio, of which Cleveland is the county seat, tried out various types of paving materials ten or twelve years ago and since that time has been laying brick exclusively. During 1912 the county put in seventy-two miles of brick pavements which made a total of four hundred and five miles of brick-paved country highways leading in and out of Cleveland. Many miles of brick-paved country roads were laid out of Buffalo, N.Y., by the New York State Highway Department, while long stretches of this class of pavement were built in various sections of the southern and middle western portions of the United States.

The effect of road improvement on land values is forcefully shown in Cuyahoga County, Ohio, where in ten years real estate values have increased from $171,973,940 to $606,519,960. Attracted by the fact that the roads could be used at all seasons of the year, truck farmers have eagerly sought the land adjacent to the improved roads. Residents of the city who have built country homes have shown corresponding interest.

Tile Used in Good Roads

IN the general movement in favor of good roads throughout the country, tile manufacturers will reap benefits as well as paving brick manufacturers, as an essential feature of good roads is good drainage and the principles of good drainage remain the same, whether the road be constructed of brick or other surfacing. Large drain tile are frequently used for culverts and smaller drain tile for draining low spots in the roadway.

The brick-paved Canal Road, Cuyahoga County, Ohio

Typical country highway of vitrified brick

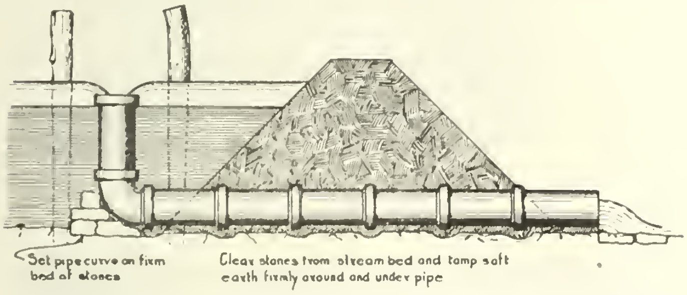
Vitrified Clay Pipe and Tile Work

Its Application to Road Building—Importance of Standard Specifications in this Field—Use of Materials

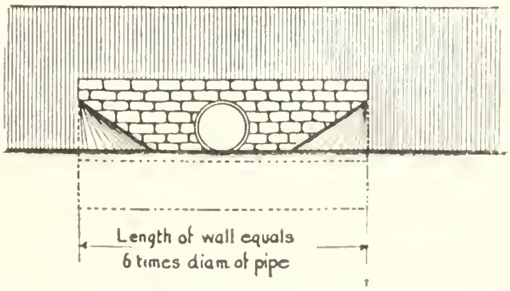
By G. H. Tefft

ABOUT half the money spent for road building is expended in bridges and culverts. This is simply another way of saying that the science of road building itself is not a matter of moving earth, but is, to a large extent, a matter of hydraulic engineering—that is, the proper control of water. If we succeed in getting the water which falls upon or runs beside the road properly controlled, the mere maintenance of its surface is thereafter a very simple matter.

The part of the money which we must spend in this way—that is, under the road instead of on it—should receive the greatest amount of engineering study because, although no road surface is absolutely permanent, it is on the contrary, quite possible to make the structures which hold it up—the bridges and the culverts—absolutely permanent, so that what we spend in the first place need not be spent over and over again.


Set pipe curve on firm bed of stones
Clear stones from stream bed and tamp soft earth firmly around and under pipe

Lengthwise section of gulley showing cross section of earth dam and installation of vitrified clay sewer pipe underflow



End view of vitrified clay pipe culvert with dimensions in terms of pipe diameter

The greatest difficulty connected with the building of culverts is that they are so extremely simple to build right that the engineering talent throughout the country has been directed to larger and more interesting structures built in newer and more complicated materials, while the simple old vitrified road culvert has been left to take care of itself. A country is sometimes able to persuade itself that it can afford to hire the best engineering talent to assist it in the construction of a large bridge or court house, but few have come to the point of seeing that the same demand for technical ability exists in the construction of the numerous small structures which are scattered all along the road, and which impede the traffic on it when they fail quite as much as would the failure of the big bridge.

No county will go to the trouble and pains of preparing definite drawings and specifications for each little culvert, and yet such a definite drawing and specifications is absolutely essential. The way out of this difficulty is, first, after studying the needs of a whole district or an entire county, to frame up a standard drawing and specification which, with proper variations, can be used in a great many cases. In other words, we find that although it is impossible to give each separate culvert the engineering attention that it deserves, we can, by lumping a hundred or a thousand of them together under one standard but variable specification, make a good engineering job of all of them, and thus avoid the disappointing breakdowns and the material wastes which occur when every gang foreman builds each culvert according to his own ideas.

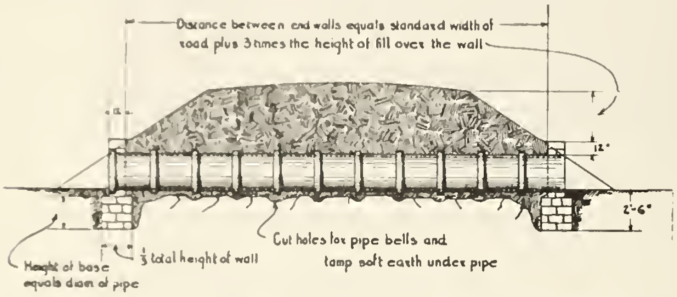
A study of existing culverts will disclose two very bad faults which, nevertheless, are surprisingly easy to overcome when once pointed out. One is the failure to prepare a proper bed for the pipe to rest in. Countless railway superintendents, as well as wagon road builders, have come to the erroneous conclusion that vitrified clay pipe will not hold the weight of a locomotive, simply because they have never prepared a proper bed for it to rest in. When this is done there is no locomotive and no road roller which is too heavy to be supported by vitrified clay pipe culverts.

The first thing to be done, then, is to write a standard specification stating exactly how the culvert pipe shall be laid in the trench, how the hard pan, or rock bottom—if such exists—shall be excavated far enough down so that the pipe does not rest directly on it, and how the earth or other fine material shall be well tamped in around it so that whatever weight it is required to carry will be carried equally upon the lower half of the pipe.

It is important to specify proper jointing, not for the sake of water-tightness itself, but to be sure that water, leaking through poorly made joints will not undermine the culvert and let it drop—for this is a menace to the permanence of the structure.

The next serious defect one notices frequently existing in culverts is the absolutely wrong construction of end walls. Since it is vastly easier to pile stones one on the other above the ground than to excavate and lay them on a lower level, almost all culvert walls will be found much higher than necessary over the pipe and not nearly deep enough under it The action of running water is always to work downward and not upward. To overcome this burrowing action, which always undermines the end of unprotected culverts, the foundation of the end wall should be not less than 30 inches below the bottom of the pipe Unless hard rock or hard pan is reached at a higher level here is where most of the material should be placed. A single foot of wall over the top of the pipe will suffice, but when we come to a deep ravine where the road is several feet above the natural stream bed in which the pipe must be placed, instead of attempting to hold the whole side of the road up we should make the culvert longer so that the natural 1½ to 1 slope at the side of the road will maintain itself naturally without the assistance of a wall. Then, as before, all the wall we need is a generous portion below the pipe to prevent undermining, and one foot above it to keep the earth from running into it.

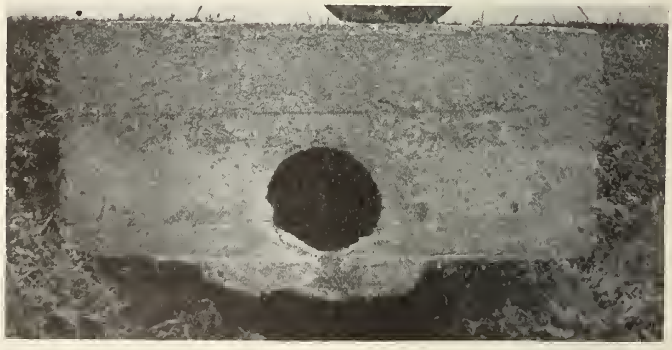
These are but two of a great many things that can be provided for by standard specifications and applied to hundreds of culverts at once without the intervention of an engineer in every case. In order that specifications should apply to a hundred cases as well as to one, all the dimensions of a culvert which must vary should be stated in terms of the diameter of the pipe itself. For instance, in order to prevent the earth from falling around the ends of the bulkheads and clogging the pipe, and also for sufficient protection on either side against erosion, the length of the culvert wall should be six times the diameter of the pipe; its width at the base should be a certain proportion of the height and so on.


Distance between end walls equals standard width of road plus 3 times the height of fill over the wall
12"
2'-6"
Cut holes for pipe bells and tamp soft earth under pipe
⅓ total height of wall
Height of base equals diam of pipe

Cross section of road showing dimensions for vitrified clay pipe culvert with dimensions in terms of road widths and fill

When properly bedded, no locomotive or road roller is too heavy for vitrified clay pipe culverts

The upstream end of the special soil catching culvert protected by stakes. Where the boy stands was, a few seasons ago, a high wooden bridge



It is easier to build culvert walls up in the air, but this illustration shows that they ought to be sunk deep in the ground

Similarly figuring on a 1½ to 1 slope for the sides of the road we can state beforehand just how many lengths of pipe will be required for each depth of culvert. Starting, for instance, with a 16-foot roadway and assuming that a 24-inch culvert will be placed 8 feet below its surface, the distance from the top of the culvert wall—if one foot over the pipe—to the top of the road will be five feet vertically. We therefore add to the 16-foot roadway 3 x 5 feet, giving a culvert 31 feet long; or, simpler still, to avoid any calculations whatever, we can make a table which gives the number of lengths of clay pipe for each depth of fill.

Having determined by survey the position of the culverts for the new road with the required fill for each, and having similarly determined by survey the area drained by each one and what its diameter should be to drain it, we are then in a position to direct all the culvert work from one office with one set of plans and specifications, and to order exactly the right material to be delivered on the site of each, from the engineer's field book. This plan has been followed with great success by railroads in standardizing their bridges, and by cities in standardizing the designs for their sewer manholes and other sewer details, and it will have the same beneficial result in road construction.

Along with a good standard specification should go a uniform use of materials. In all public works—other things being equal, or anywhere near so—the community succeeds best in its engineering by adopting the simplest materials to work with. This should be true of culverts. Culverts are bound to be built in remote parts, far from a central office, and in such small units that an inspector could not possibly be sent to oversee all of them. For this reason, material like vitrified clay pipe, that has been automatically inspected by 2,000 degrees of fire before being delivered on the work and is then delivered in an absolutely finished state requiring no further attention in itself, is bound to produce more uniformly good results in the hands of all sorts and classes of workmen, under necessarily meagre superintendence than any other material known.

Up to this point I have been discussing culverts purely as a means of maintaining a road. It was while examining many culverts throughout the rural districts of Missouri that I discovered by accident a plan adopted by certain shrewd old farmers in Jackson county where an old road culvert could be made not only to maintain the road but many acres of adjoining property as well. These farmers were in possession of land which at one time had been abandoned because the only valuable part of it—that is, the top soil—had been washed off by rains after a few years of cultivation, and there remained only a series of deep gulleys extending through the fields and across the county roads under small bridges which, in some cases, were so high that a man could ride under them without getting off his horse. The Missouri River had taken the best parts of their farms and deposited them at the bottom of the Gulf of Mexico. Now to prevent this disastrous waste was, however, a very simple matter when the secret was once discovered. A man named J. H. Baile, so far as I am able to discover, seems to have been the first to realize that all the scientific bulletins issued by the government and others on the subject of the proper treatment of farm soils and rotation of crops were practically useless if the soils had already departed and the crops had ceased to grow. Being at about the end of his resources, he applied to the county for permission to reconstruct some of the culverts in his neighborhood so that he might be able to preserve the soil which was departing from him and bring his farm back to something like a tillable condition. Having obtained this permission, he went to one of these old wooden bridges under which he customarily rode on horseback and filled it in, first having placed under it on the natural bed of the gulley a 15 in. vitrified clay pipe culvert. The upstream end of this culvert he ended in an elbow, and on the upstanding end of this elbow he placed vertically one or two lengths of clay pipe. He drove stakes around this vertical pipe to protect it against flowing debris, tied a little hog wire around the stakes, then retired to his fireside and waited for rain. The rain, which had previously been his undoing, very soon arrived. As before, the soft, cultivated soil, on his farm began to disappear with the run-off, and the soil from the neighboring farms above him began to move down on his property through the gulleys. This soil, however, never reached the Gulf of Mexico as the rest of it had; for, upon reaching the road culvert at the bottom of his property where the old bridge had originally been, it was interrupted by the filled-in road and formed a pool. When this pool rose to the height of the upstanding end of the clay pipe culvert it begin to flow down and away as before, but the valuable soil which it had contained was deposited at the bottom of the pool. Only a very few rains sufficed to fill this deep ravine up level with the top of the culvert. It was then time to put one or two more lengths of pipe on top of the first and wait for more rain. In about eight months the entire space occupied by the bridge vanished, and was filled with the best soil from Mr. Baile's farm and that of his neighbors. Whereas previously he had been forced to cultivate his fields in seven small sections very inconveniently distributed, he is now able to plow right across these once useless gulleys and cultivate his ground practically in one piece. He not only farms what is left of his own soil, but farms all the property from his neighbors' that runs down on him. When at length his gulleys are filled up to the level of the road, he will be able to scrape dirt out of them and use it to build the road to a still higher level, thus serving himself and the county at one and the same time. It will be an advantage to the county to have the low spaces taken out of the roads, and by building the road up he will have an increased height of dam with which to catch more soil, and on which to do more farming at a greater profit.

The old style wooden road culvert which frequently washed out or decayed and always allowed torrents to carry away the best soil on the land

A former farm gulley completely filled with rich soil by a specially constructed vitrified clay pipe road culvert

Tannic Acid for Clay Roads

Early this season, Mr. S. Peace, of Toronto, patented a process for the treatment of clay roads with tannic acid. According to this gentleman's statement, the acid dissolved in water and applied to the clay roads is expected to overcome the alkali in the clay, render the clay impervious to water and leave a moist, smooth, noiseless and dustless road on which the grass or weeds will not grow. A solution of one pound of tannic acid, dissolved in from 10 to 20 gallons of water, will be used and applied to the road in such a way as to secure the greatest possible penetration. A series of treatments on a scarified road, the operations to be carried on in dry weather, would probably be necessary to test the theory. A mere surface treatment penetrating an inch or so, would not be sufficient, as there must be a thick enough covering of treated clay to distribute the concentrated wheel load over a suitable area of subsoil. If this were not done, the clay beneath the surface would become saturated with moisture and turn into mud, and the surface would be immediately cut through. The inventor states that the patent restrictions will not be applied and that free use of the process is given to the public.

General view of the plant of the Sun Brick Company, Limited.

An Efficient Plant in the Don Valley

Excellent Resources of the Sun Brick Company, Limited, Toronto—An Electrically-Lighted Yard — Equipment Used — Personnel of the Firm

THE Sun Brick Company, Limited, formerly the Sun Brick Company, owned by Messrs. Taylor & Booth, was incorporated in November, 1911, when Colonel Sir Henry Mill Pellatt took over the controlling stock held by Mr. Booth.

The company own 135 acres in the Don Valley. The deposit contains an unlimited amount of clay of the buff, red and shale varieties, and an abundance of red and grey moulding sand for building purposes. A switch line of the Canadian Northern Railway runs into the yard, and the Canadian Pacific Railway, immediately east of Leaside Junction, bounds the property on the north and west.

The Sun Brick Company, Limited, have spared no expense in putting up their plant and their buildings are all substantial ones of brick and concrete. A noteworthy feature is the electric lighting throughout the buildings and yards, the latter being particularly well served in this respect so that no difficulty is experienced in loading the cars on the switch line in the darkest weather. It is claimed that this is the only brick yard in Canada lighted by electricity.

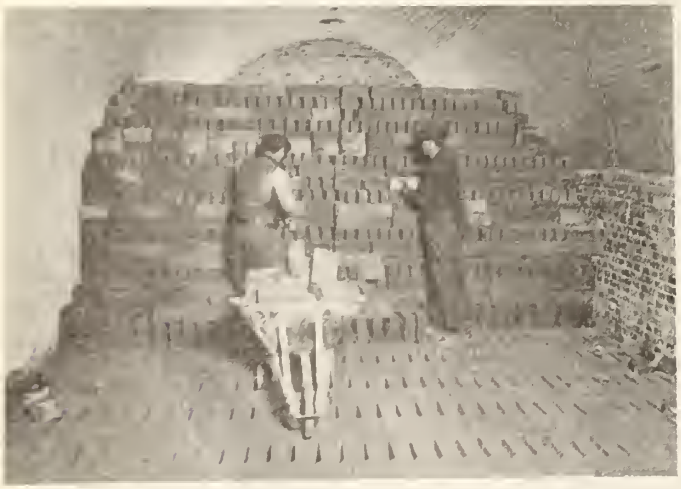
All the plant in use is of the latest type and has been installed with a view to the greatest convenience and efficiency. The motive power throughout is electricity. The Sun Brick Company, Limited, are using a "Raymond" Gas Producer Kiln and are the pioneers in Canada in this respect, they being the first to erect such a plant in this country. This "Raymond" kiln is an eighteen chamber compartment continuous kiln and has a capacity of 80,000 to 100,000 a day. Four 6-foot gas producers are needed to generate the gas, the building which contains them having two storeys, the upper one being used to pour the coal into the producers. A large side cut wire cut brick machine and a Henry Martin improved soft mud machine, with pug mill and rolls attached, are used for the brick-making. Details of the plant are given below.

The company are now working at full capacity and are turning out about 80,000 grey and red common brick a day. At present all the bricks are being loaded directly onto the cars in the yard but next year the company propose putting on some teams and motors for delivering in the vicinity.

Arrangements are being made to build a large number of houses for the employees.

The officers of the Sun Brick Company, Limited, are: Sir Henry M. Pellatt, president; Mr. R. S. Wilson, vice-president; Mr. Reginald Pellatt, secretary-treasurer.

The process of making brick by the machinery in this plant is known as the stiff mud system, which is



Taking out burnt chamber bricks.

View of tunnel drier

Sir Henry M. Pellatt, president

Mr. R.S. Wilson, vice-president

Mr. Reginald Pellatt, sec.-treas.

OFFICERS OF THE SUN BRICK COMPANY, LIMITED

wire cut, and consists of the taking of the blue shale from the banks of pits, grinding it under the mullers of heavy duty dry pans, each pan weighing 36,000 lbs. Then the material is run in cup elevators up to a height of 50 feet, emptied over piano wire screens and screened to a fineness of powder. The screens deliver it into shoots, which pass it into the heavy duty pug mills, where it is thoroughly mixed with water before going into special machines and forced through dies into long columns, after which it is cut into thicknesses of brick. From the machinery at this point the bricks are stacked on small cars and run into a series of tunnels, in which all of the moisture is taken out of the bricks in about twenty-four hours.

A soft mud apparatus has also been installed for use with the residual clays. The drying system for these clays is much the same as that described for the stiff mud.

The drying apparatus is known as the metallic radiation type of dryer. All the air is pure and clean. No products of combustion can come in contact with the ware and cause discoloration from the alkali content of the fuel.

Alley way between the 18-compartment gas kiln

The method of burning employed is the latest and most scientific, in that it conserves the fuel and shows a saving of 70 per cent. over the old methods. There are also very small quantities of ashes to handle, which considerably lessens labor charges. The kiln is composed of a series of chambers each holding one day's run. The chambers are built one after the other with one division wall between and so arranged that the waste heat from one will carry to the next succeeding chamber.

The burning is accomplished by first turning the coal into what is known as producer gas. This gas is unscrubbed and unwashed and is carried to the chamber to be burned at a high temperature. The oxygen necessary for combustion meets the gas in the combustion chamber made for it after passing over thousands of brick in various stages of cooling from 300 deg. to 1600 deg. F. Combustion takes place at this high temperature. The products of combustion after doing duty of burning are still further utilized to raise the temperature of the six or seven next succeeding chambers. In this way the fire continues each 24 hours. The gas is attached to the next succeeding chamber and goes on continuously in the manner mentioned. For example, if the burning temperature is 2000 deg. F., the next chamber in front will be 1600 deg. and therefore the amount of fuel used is only that which is necessary to raise 1600 deg. to 2000 deg., the finishing temperature.

As regards uniformity, absolute control of the gas by valves and proper recording pyrometers, allow the burner to know exactly what is taking place inside the kiln. Then again, the burning chamber has a blanket of heat on either side of it at least 1600 deg. in temperature so that the fluctuation of heat between the top and bottom of the kiln is not over 50 deg. This is an ideal condition as against 300 deg. difference in down drafts and 500 deg. variation in up drafts.

The accompanying photographs, which were taken expressly for this journal, will convey a further idea of the extent and manufacturing possibilities of this up-to-date plant.

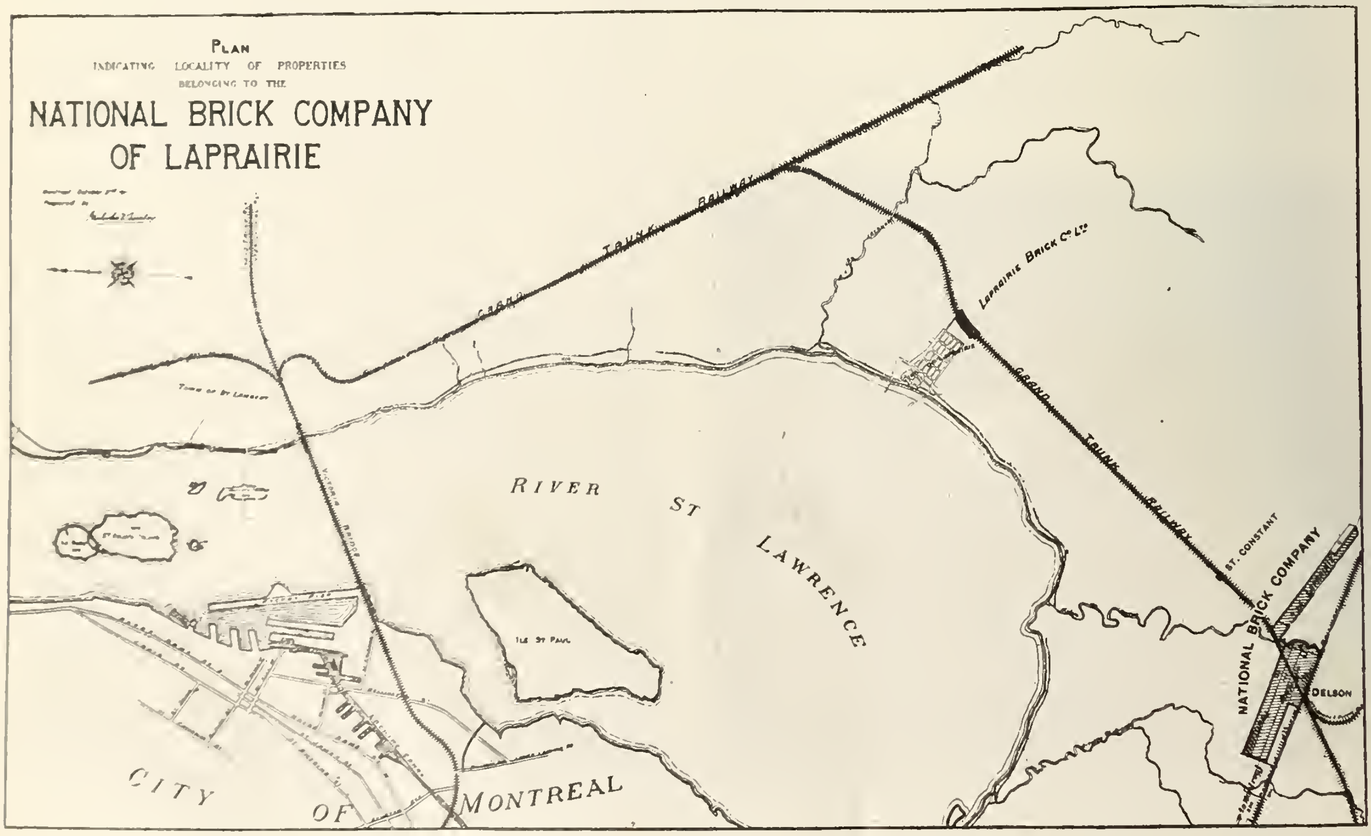
Extensive Operations at Laprairie

National Brick Company's Two Plants Have Combined Capacity of One Hundred and Thirty-Five Million Brick per Annum

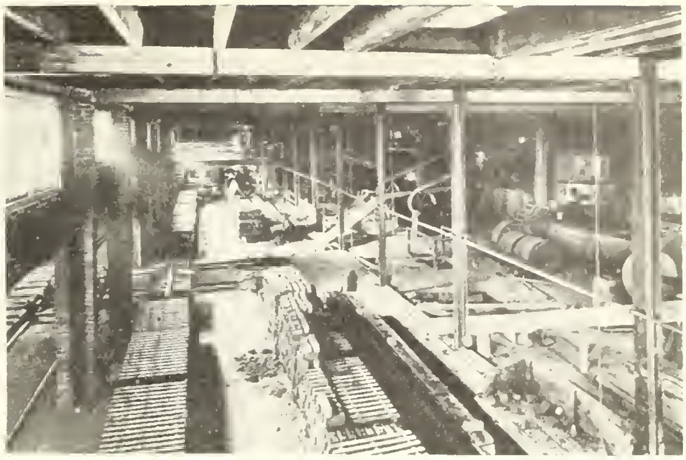
WITH the enormous activity in building operations throughout the Dominion, there has arisen a very large demand for bricks of all descriptions. Canada is unable to supply all her requirements, and has to import millions from the United States and Great Britain; but even with the importations, the supply is not equal to the orders, and contractors find it exceedingly difficult to get what they require. Following on this activity, new brick-making plants have been established, and the directors of the incorporated companies have had little trouble in getting the required capital from the public. It is just over twelve months ago that the National Brick Company, Ltd., of Laprairie, P.Q., was organized, with a capital of $5,000,000, of which $2,000,000 was common stock. Those interested in the company had previously obtained a controlling interest in the Laprairie Brick Company, a prosperous concern, in operation for over twenty years, whose products were very favorably known. The Laprairie plant has a capacity of 60,000,000 bricks per annum. Later the entire stock holdings in the Laprairie Company were secured, and it is now worked in conjunction with the National Company.

Once the National Company was organized, no time was lost in constructing at Delson Junction, four miles from the town of Laprairie, a plant capable of turning out 75 million bricks per annum. Mr. L. W. McArthur, manager of the Laprairie Brick Company, was appointed general superintendent, and designed the whole plant. It is admirably situated near the railway stations of the C. P. R. and Grand Trunk, and is connected with these railways by sidings, giving direct access to the lines. Altogether the company own 320 acres of land, composed of clay and shale which is eminently suitable for manufacturing high grade bricks. The clay is identical in character with that of Laprairie, and the products of both are of great tensile strength. The depth of the clay on the Delson property is from 18 to 20 feet, while the shale deposit runs to a depth of 1,800 feet—there is, in fact, a practically unlimited supply of raw material.

In starting a new concern delays are inevitable, but it is creditable to Mr. McArthur that the plant was so quickly built and put into operation. It is laid out with the idea that the process is continuous—that no unnecessary work is involved, and that from the moment the clay or shale is taken from the pit it shall be carried forward until it is manufactured and put into the railway cars. With this object in view the principal part of the plant, the manufacturing shop, is placed in the centre, with the kilns at either end. The beds are about a quarter of a mile distant and are connected with the works by means of a standard gauge railway. The clay is loaded into the cars by a Marion shovel, and conveyed to a runway by a locomotive. The cars are hauled to the top of the building by a cable, and run on rails to the ten 9 ft. dry pans or grinding machines, being dumped by a special arrangement. The clay is then gradually fed to the grinders, from where it is elevated by means of bucket elevators to the screening room. Any clay or shale



Loading brick from kiln to car



Interior of manufacturing building

not sufficiently crushed goes back to the grinders in tailing shoots and is re-ground. From the screening room the raw material is fed into 16 feet pug mills, and then goes to the lower floor, where the plastic brick machines are situated. These machines, together with the pug mills, were specially designed and built for the company by the C. W. Raymond Company, of Dayton, Ohio. There are two plastic brick machines, one at each end of the building, the brick being cut by rotary cutters. The green bricks are conveyed from the machines on belts, and are loaded into dryer cars, which run on lines laid throughout the length of the building.

The dryer is situated at the side of the building, and the cars are run into the dryer, which is heated by the waste heat from the kilns. The dryer consists of twelve tunnels, with three tracks to each tunnel. The waste heat is conveyed from the kilns by means of brick flues, and is forced into the dryer by two 240 in. fans. The green bricks remain in the dryer 24 hours, and from there are conveyed on rails to the kilns; these contain a total of 64 chambers, each capable of taking 90,000 bricks. The kilns are constructed on the continuous system, modified according to Mr. McArthur's ideas of the requirements of the plant. The two chimney stacks are 180 feet high. The railway lines run alongside both sets of kilns, and the bricks are loaded right into the cars from the kilns, which are under cover.

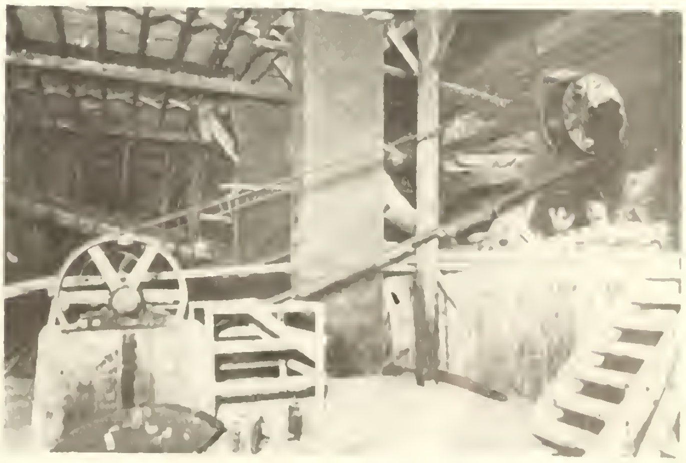
Two large hoppers are built on the main floor, and in these reserves of the ground material are kept. The whole machinery was specially manufactured for the company, who have undoubtedly one of the finest plants in Canada. The buildings are so designed that in future the plant can be easily duplicated. The machinery is operated by electricity, the current being obtained from the Montreal Light, Heat and Power Company. Two motors are installed, one at each end, so that there is no likelihood of a breakdown. Water is secured from an artesian well. The employees number about 200, some of them residing in houses built by the directors.

The company have been exceedingly busy during their short existence, and have not been able to fill all the orders which have been received. The contractors in the district of Montreal are likely to be busy for many years to come, and appearances point to a continued big demand for the company's productions.

The directors are Mr. J. N. Greenshields, K. C., President; Mr. Wm. Lyall, Managing Director; the Hon. Robert Mackay, and Mr. C. R. Whitehead.

A press bulletin of the U. S. Geological Survey, on the Hudson River brick-making industry, tells of a bit of brick history that Jefferson Middleton has included in his report of this famous brick-making region. He gives to James Wood, an English brickmaker, credit for starting the business, back in 1817, that has grown to such proportions. Other prominent pioneers in that field were the Allisons and David Munn, while credit is given to Richard A. Ver Valen for inventing, in 1852, a brick machine that gave great impetus to the industry. Another interesting feature

One of the motor rooms



One of the grinders

of this report is in the estimation, that notwithstanding the great quantity of brick that has already been made and sent out of that region, and the present enormous rate of production, there is clay there yet to serve for a half century.

The Standard Brick Company, Limited

THE Standard Brick Company, Limited, have an excellent example of an up-to-date plant at Greenwood avenue, Toronto. This company operate in soft mud and turn out from ten to twelve million brick annually.

A special feature of the plant is the summer yard in which all the machinery is run by electricity. This yard alone has a capacity of 30,000, making the total summer output 60,000 a day.

The equipment throughout is of the latest pattern, and the various departments are conveniently situated so as to avoid any duplication of labor in moving the bricks more than is absolutely necessary. The brick-making machinery used are Martin machines for stock brick; the installation for the drying process is the vacuum pipe rack dryer with a capacity of 33,600; the total kiln capacity is 850,000 and a Baird crusher works up the clay. An 80/100 h.p. tubular boiler provides the power with the exception of that used in the summer yard.

The Standard Brick Company, Limited, supplied lining brick for the new Canadian Pacific Railway building at Toronto and are at the present time delivering stock brick to the C. P. R. terminal at Simcoe street.

The illustration shows the officers and employees of the company in front of the plant. The company have an office at 377 Broadview avenue, Toronto. Mr. G. J. Steele is President and Mr. Charles Bulley, Secretary-Treasurer.

Always push for first-class building methods and push hard, says Building Progress. Talk fireproof houses, stores and factories. Let the other fellow do the cheap work. Study new methods and inform yourself about their advantages. Every professional man keeps at the head by informing himself about new processes as fast as they appear, and you must do likewise or drop into a rut. Hustle for business and you will get your share.

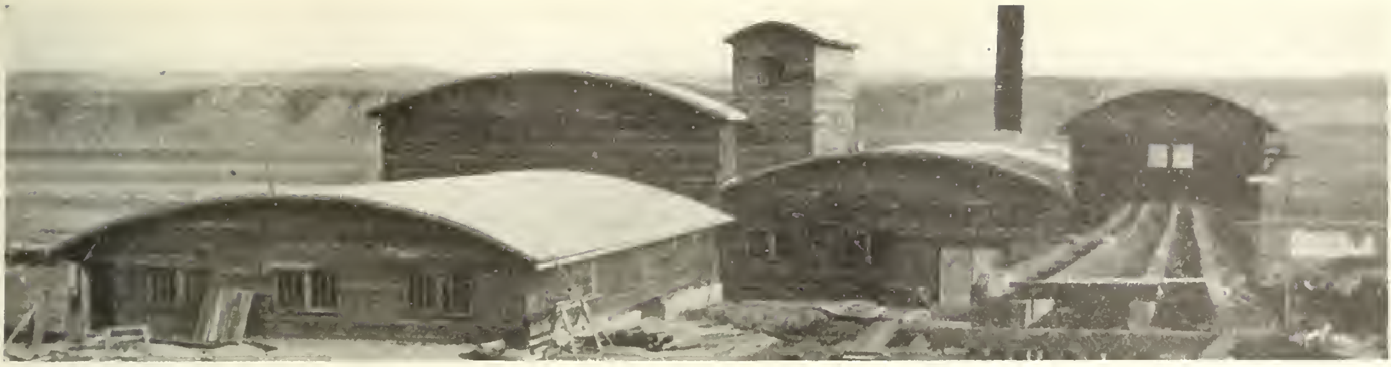
Important Extensions of the Don Valley Brick Works

DURING the past year important improvements have been added at the plant of the Don Valley Brick Works which will add materially to the efficiency and output of the works. The company are at present working shale to a depth of 65 feet. One of the new installations is a series of four heavy duty dry pans which have a capacity of 80,000 shale wire cut bricks a day. These dry pans improve the quality of the shale by rejecting any which has formed into a clod and also by removing any stones. Attached to these pans are continuous elevators which carry away the dried shale, thus saving much time and labor.

The most noteworthy feature, however, which has been added during the past year is the "Youngren" Producer Gas Fired Kiln. Some idea of the size of this kiln may be obtained from the fact that twenty-five car loads of iron piping, 1,000,000 fire bricks and 2,000,000 building brick were used in its construction. This kiln is made up of two batteries, each 210 feet long by 60 feet wide, with a space of 25 feet between each battery. The gas is generated in five 6-foot sealed gas producers. The producer building has brick walls, steel beams and terra cotta arches. The capacity of the producer kiln is 100,000 a day and 1,500,000 brick were ready to be put into this kiln on the day it was equipped for operation.

The Don Valley Brick Works have also been building more storage space for their moulded brick. Part of this building is devoted to stables, and the first floor makes excellent quarters for their draughtsmen, all the designing being done at the works.

Group of employees in front of the Standard Brick Company's plant, Toronto.



Tregillus Clay Products Company's plant near Calgary, Alta.

Calgary's Connection with the Industry

The Tregillus Clay Products Company and Its Founder, W. J., the "Millionaire Farmer" — The Manufacturing Facilities

CALGARY is very fortunate in having a large and up-to-date plant at her doors. During the past summer Mr. W. J. Tregillus, "the millionaire farmer," has erected a large stiff face-brick plant with a daily capacity of 150,000 bricks. This plant is situated just five and a half miles west from the centre of the city.

Mr. Tregillus is a well-known agriculturist who came to Calgary some eleven years ago from England, and who, after purchasing land just outside the city, actively engaged in dairying and breeding Holstein cattle. To-day, he is the President of the United Farmers of Alberta. Besides numerous other properties, Mr. Tregillus owns the 200-acre block of land on which the plant is situated. This piece of land consists of from 60 to 70 acres of the main hill along the south of the Bow Valley. The balance of the land is a part of the large flat through which the Bow River runs. Mr. Tregillus had numerous enquiries as to whether he would sell this property for the manufacture of bricks. Thinking that there might be some truth in the statements made by would-be purchasers, he had samples of the clay and shale tested by Professor Orton, who pronounced the shale of a quality much superior to that generally found in the Western Provinces. Mr. Tregillus then decided to go into the clay business, and on the recommendation of Professor Orton procured the services of Mr. W. G. Worcester, who has taken charge of, and who constructed the plant.

Mr. Worcester was one of the pioneer students of the Ceramic Engineering departments of the State University of Ohio. Since completing his course there he has designed and built several of the largest and most successful roofing-tile and terra cotta plants in the States. He was managing a large plant at Detroit when he was called to investigate the clay properties of Mr. Tregillus. While making a careful survey he realized the great possibilities of the clay in-

Mr. W. J. Tregillus

Buildings of the Tregillus Clay Products Company, including storage shed and boiler room dustry in the West, and it required little persuasion to induce him to resign his Detroit position and accept the one offered him by Mr. Tregillus.

Mr. Tregillus has formed a close corporation company called the Tregillus Clay Products Company. The business will be conducted largely by his son, Mr. C. A. Tregillus, and by Mr. A. L. Tregillus, his nephew. Mr. Worcester will have charge of the manufacturing end of the business.

The company are particularly fortunate in the lay-out of their works, the location being immediately adjacent to the main line of the Canadian Pacific Railway and the Bow River. The shale and clay lies in the hill, and the flat land of about two hundred yards in width between it and the railroad has been utilized as the factory site. Thus everything goes to make the place very advantageous for the lay-out of the plant, with ample railway sidings connecting on to the C.P.R. main line both east and west of the works.

The factory, which consists of the various units of manufacture grouped into one well and conveniently arranged whole, has been laid out with the idea of enlargement in the near future. The shale, which will be excavated by a steam shovel, is brought down from the hill to the storage shed by gravity. This shed is large enough to hold material for a week's run so as to provide against bad weather. The shale is conveyed to the dry-pans by belt conveyors. Other interesting features are the large storage bin and automatic clay feeder. The bin holds enough ground clay for a day's run, thus providing against any break-downs to the dry pans or conveyors. The feeder regulates the clay feed into the pug-mill. The pug-mill is also fed by a belt which carries back from the cutter all odd pieces of clay and imperfect brick which are not good enough to pass on to the dryer. The dryer consists of seven tunnels of reinforced concrete, 105 feet long, with a double track in each. Next Spring the company hope to increase the number to twelve tunnels. In the drying process the forced draught and waste heat system has been used. Two large fans are in operation to create sufficient draught. A specially designed gas furnace is in readiness to create enough heat should at any time there not be enough obtainable from the kilns.

Belfast truss used in the construction of the plant

The kilns, which will eventually number twelve, are now being constructed as they are required by the output of the plant. They are all of the down-draught rectangular type and will hold 200,000 bricks each. The flues are so arranged that should there be more heat than is required for the dryer the surplus heat can be turned into a kiln which is in the water-smoking process, and thus save that amount of fuel.

Gas is to be used throughout the plant, though provision has been made to use coal should the gas supply fail at any time. The company have laid five miles of 6-in. gas main in order to bring the natural gas now used in Calgary to the works.

The water supply for the works is drawn from the Bow River by a 4-in. pipe. The pumping station is situated on the river bank and the water is pumped into a 40,000 gallon reservoir which is at a sufficiently high elevation to keep the 800-gallon service tank, in the roof of the main building, filled. Provisions have been made throughout the factory so that the plant may run all the year round. The company also propose to use the river water for stripping their shale.

Most of the machinery has been brought in from across the line. The Bonnot Company of Canton, Ohio, supplied the brick machinery, and the L. E. Rodgers Company, of Chicago, the dryer equipments. The 350 h.p. Corliss engine and the three 150 h.p. boilers were purchased from E. Leonard & Sons, of London, Ont. Room has been left for a fourth boiler should the company wish to increase the power.

Owing to the scarcity of brick in the west, the walls of the buildings and rooms have been constructed of concrete to about eight feet above the foundations. Above this, the walls are of frame, and it is the intention of the company to brick veneer them as soon as convenient. There is, however, an exception, namely, the wall between the boiler room and the main building, which has been run up in concrete to about two and a half feet from the roof as a safeguard against fire.

In order to avoid pillars and so have clear floor spaces, roof trusses of the Belfast type have been used. The span in the main building is 46 feet. The trusses are placed 10 feet apart and have a rise of 5 ft.

The scientific end of the clay business has not been overlooked by the company, A laboratory and test kiln were erected on the property as one of the first steps, and during the whole summer research work has been carried on in connection with the various clays found on the property and in the neighborhood of Calgary. By these tests the company are fully assured that they will easily be able to compete with all the high-grade brick now being imported into Calgary from the States and Eastern Canada.

The welfare of the company's employees has also been looked after. Three large bunk-houses, each to hold thirty men, and ten small ones each to hold eight have been erected, together with a large dining room and several cottages.

The entire work, planning and construction of the buildings, machinery, and equipment, has been carried out by the company's own men. Next year it is the intention of the company to erect a sewerpipe and also roofing-tile plant. These are to be situated directly west of the present plant.

Last August the company bought over a common press brick plant with a daily output of 80,000, and also a plant for the manufacture of fireproofing blocks. The company are remodelling the latter plant so that it may prove more efficient, and it is hoped that it will be in operation again in the early spring. These plants use electricity for power and gas for fuel. Their situation could not be improved upon as they are on the Canadian Pacific Railway and near enough to Calgary for city delivery.

The officers of the Tregillus Clay Products Company are as follows: Mr. W. J. Tregillus, president; Mr. Cyril A. Tregillus, vice-president; Mr. Arthur L. Tregillus, general manager; Mr. W. W. Cary, sales manager; Mr. W. G. Worcester, superintendent.

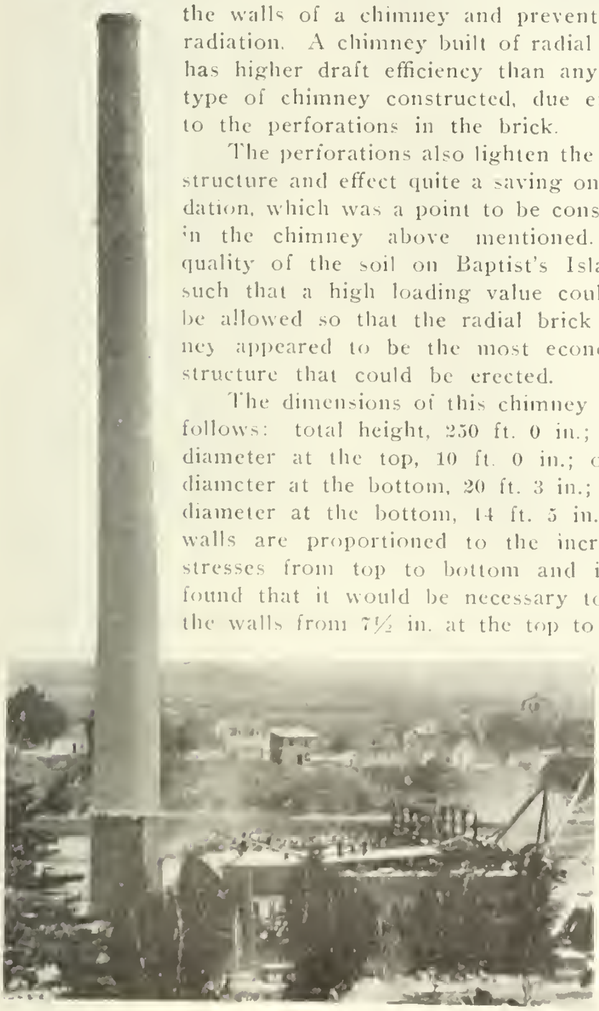
The Higest Brick Chimney in the Dominion

ONE of the most notable examples of chimney construction is to be found in the portland radial brick chimney recently constructed for the Wayagamack Pulp & Paper Co. on Baptist's Island, Quebec. This chimney is said to be the tallest radial brick chimney in the Dominion. Its exact dimensions are 250 ft. high by 10 ft. in diameter, and its purpose is to serve the large boiler plant for the above company's paper mill. Since being put into operation it has proved very successful.

Chimneys built of radial brick have several advantages over the ordinary type of common brick chimney heretofore most frequently erected. These radial bricks are perforated vertically. The perforations form dead air cells which prevent rapid heating and cooling of the walls of a chimney and prevent rapid radiation. A chimney built of radial bricks has higher draft efficiency than any other type of chimney constructed, due entirely to the perforations in the brick.

The perforations also lighten the whole structure and effect quite a saving on foundation, which was a point to be considered in the chimney above mentioned. The quality of the soil on Baptist's Island is such that a high loading value could not be allowed so that the radial brick chimney appeared to be the most economical structure that could be erected.

The dimensions of this chimney are as follows: total height, 250 ft. 0 in.; inside diameter at the top, 10 ft. 0 in.; outside diameter at the bottom, 20 ft. 3 in.; inside diameter at the bottom, 14 ft. 5 in. The walls are proportioned to the increasing stresses from top to bottom and it was found that it would be necessary to vary the walls from 7½ in. at the top to 32 in. at the bottom. The chimney is lined with special radial brick for 60 feet, which prevents the hot flue gases from impinging against the interior walls of the chimney proper. A pleasing effect was secured by building the first 30 ft. of the chimney octagonal in shape, with the balance of it round. The chimney is capped with a cast iron top and is fitted with lightning conductors.



Brick Chimney, Baptist's Island, Quebec

The chimney above referred to was built by the Canadian Kellogg Company, Limited, of Montreal, Toronto and Winnipeg, who have had a wide and extended experience as specialists in this line of work.

The Hamilton and Toronto Sewer Pipe Company, Limited, of Hamilton and Toronto claim to be the oldest company manufacturing sewer pipe on the continent. This business was established in 1860, and has been in operation ever since, manufacturing sewer pipe and other clay products. To-day the company have a most up-to-date plant and are making an excellent product. Their goods are shipped from the Atlantic to the Pacific. A large storage building has just been erected. In this is installed a new grinding system which, together with their new factory extension, will greatly increase their output and enable them to operate the year round. During 1913 all orders will be taken care of promptly, in keeping with the company's reputation for prompt delivery. Prospective purchasers of clay products will do well to communicate with this firm.

Extensive Plants for Nova Scotia Clay Works, Limited

The Nova Scotia Clay Works, Limited, was incorporated on February 29, 1912, with an authorized capital stock of $2,000,000 and a paid up capital stock of $600,000. The company purchased the business of the following concerns: Maritime Clay Works, Ltd., Pugwash; Elmsdale Brick & Tile Co., Elmsdale; James Miller & Sons, Shubenacadie; Buckler Brick Co., Ltd., Annapolis Royal; Valley Brick & Tile Co., Ltd., Middleton, Avonport, and Bridgetown. These firms were consolidated under the name of the present company.

The officers and directors of the company are as follows: Mr. John R. McLeod, president; Mr. R. L. McDonald, vice-president and general manager; Mr. F. S. Coombs, secretary-treasurer and general sales manager; Mr. O. E. Smith, Honorable W. B. Ross, K.C., Frank Stanfield, J. R. Douglas, and F. M. Brown, directors. The head office of the company is 98 Granville street, Halifax.

The market for the products of this company extends over the entire Maritime Provinces and Newfoundland. From their Pugwash works they can ship up the New Brunswick shore and as far as Gaspe in Quebec, also to Newfoundland and all points in Cape Breton. From Annapolis they can take care of the Bay of Fundy markets and seaport towns of Nova Scotia, as well as rail shipments. From Elmsdale they are situated so that the markets of Halifax and Truro are easily available.

This company manufacture stock brick, pressed brick, farm tiles, drain pipe and hollow blocks. It is their intention to make large extensions during the winter at the various plants of the company as it is expected that 1913 will be the beginning of a large increase in the demand for the various products made. At their Pugwash works they purpose extending the plant and bringing it up to the capacity of 10,000,000 brick for seven working months. They are also installing a steam shovel to enable them to handle the clay more quickly.

At Elmsdale it is proposed to build a continuous down draft coal-burning kiln as well as kilns for pressed brick, hollow blocks and farm tiles. It is expected that Elmsdale will be one of the principal plants of the company as the terminal extensions in Halifax proposed by the Government will result in a very heavy demand for clay products. The plant at Annapolis is new, having been built this season. It is equipped with a down draft continuous coal-burning kiln with a capacity of 10,000,000 brick for seven working months. The company have also installed a steam crane for digging the clay and it is proposed to purchase and equip power-driven schooners for the coal and brick carrying trade. It is also proposed to build in the Annapolis Valley a large plant for manufacturing farm tile.

The various Governments of the Maritime Provinces are looking after the interests of the farmer by establishing Agricultural Colleges, thus putting farming on a scientific basis. The under draining of farms by the use of tile is becoming very general and it is expected that it will result in a greatly increased demand for these goods.

Mr
John Berg.
Mr. Anton Berg.
Mr.
Severn Berg.
Mr.
Melville Bertram.
Mr. R.M.
Bertram.

Personnel and Plant of the Berg Company

Progressive Toronto Concern that Has Done Much to Raise the Status of the Brick Industry

THE accompanying illustration is a group of the officers of the Berg Machinery Manufacturing Company, Limited, while on the opposite page are views of their plant at Bathurst street, Toronto. They are the manufacturers of the famous Berg brick presses, together with all kinds of brick machinery and complete brickyard equipment. Berg brick presses have met with signal success throughout the world. This is due to their excellent construction which makes it possible for the user to produce a perfectly dense brick in great capacity, and also at a high profit.

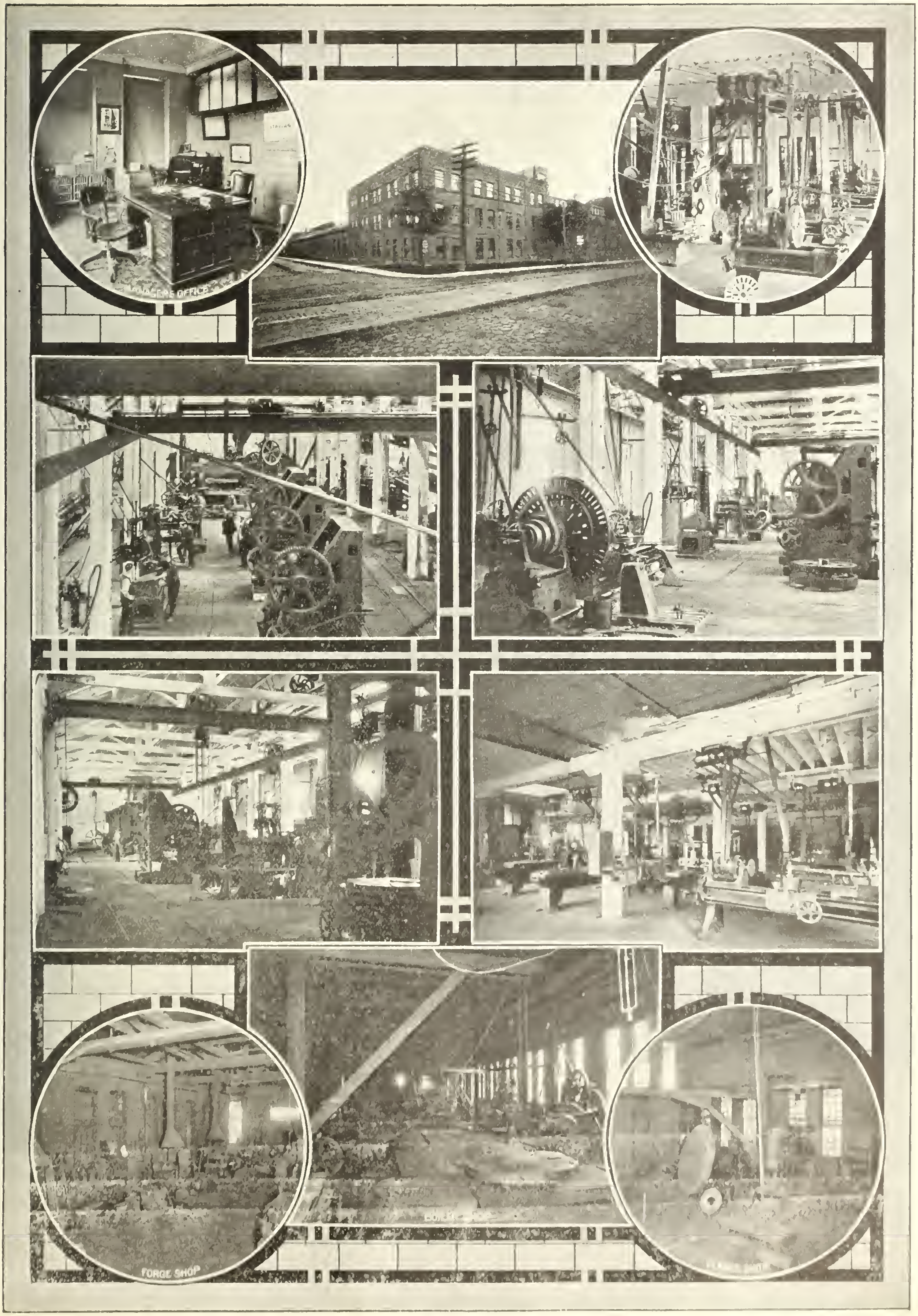
The Berg Company inform us that over four hundred of the Berg presses have been manufactured and are in successful operation. They state that each of these presses manufactures from eighteen to twenty-two thousand bricks in a day of ten hours, equalling 2,400,000,000 bricks a year. Continuing further, we find that these four hundred presses are turning out eight million bricks a day, producing under ordinary conditions a net profit of $5 a thousand, making a daily net profit of $40,000, or a net profit of twelve million dollars a year, these figures, it is claimed, being a very conservative estimate.

The Berg Company are exerting a continuous effort to raise the brick industry to the highest standard, and they have constructed one of the most modern laboratories, which is in charge of an expert chemist. It is conceded that the brick industry is one of the most important for the upbuilding of any country. The Berg Company state that bricks manufactured by the Berg process will stand a crushing test from three thousand to six thousand pounds per square inch; in other words, these bricks are metal, which will not rust or deteriorate.

While brick machinery is one of the Berg Company's specialties they also manufacture other lines, such as rock crushers, cement mills and general machinery, foundry equipment and boilers, tanks, and all kinds of plate work.

For a quarter of a century the general offices and Chicago laboratories of Robert W. Hunt & Company have been in the Rookery. Owing to the inability to secure in that building the necessary space in which to conduct their largely increased business, they have removed to the twenty-second floor of the Insurance Exchange Building, Jackson Boulevard, between Sherman street and Fifth avenue, where they will have ample space for their offices and both chemical and cement laboratories.

The Town-Planning and Civic Improvement Association was successfully launched recently at Berlin, Ont. Among the cities and towns represented were Toronto, St. Catharines, Peterboro, Oshawa, Preston, Galt, Sarnia, St. Thomas, Hespeler, St. Mary's, Parkhill.



The plant of the Berg Machinery Manufacturing Company, Limited, Toronto

Radial Brick Chimneys

Messrs. H. R. Heinicke, Inc., represented by The Black Building Supply Company, Limited, Toronto, designers and builders of radial brick chimneys, have erected a large number of stacks in Europe and this country in connection with all classes of heating and manufacturing plants.

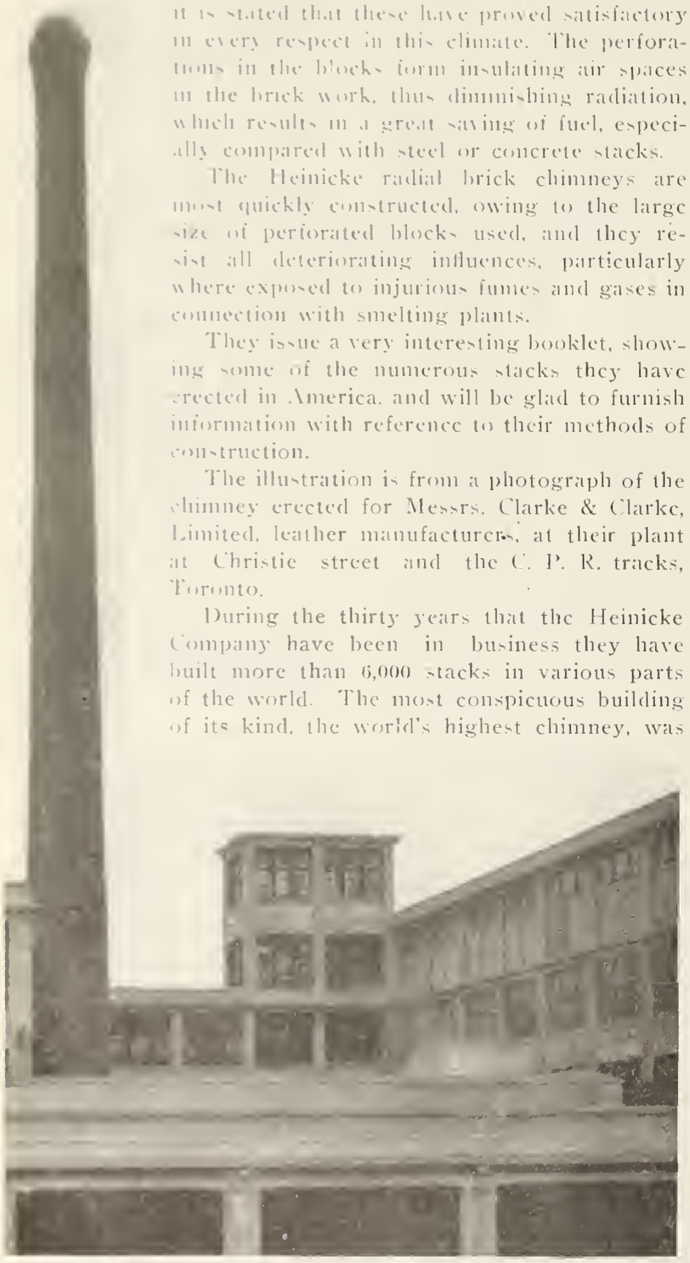
The special feature in connection with these chimneys is the "Heinicke Bond," which consists of a full mortar bed to each radial brick laid and the "breaking joints" in both directions at every course. Messrs. H. R. Heinicke, Inc., have erected a large number of stacks in Canada and it is stated that these have proved satisfactory in every respect in this climate. The perforations in the blocks form insulating air spaces in the brick work, thus diminishing radiation, which results in a great saving of fuel, especially compared with steel or concrete stacks.

The Heinicke radial brick chimneys are most quickly constructed, owing to the large size of perforated blocks used, and they resist all deteriorating influences, particularly where exposed to injurious fumes and gases in connection with smelting plants.

They issue a very interesting booklet, showing some of the numerous stacks they have erected in America, and will be glad to furnish information with reference to their methods of construction.

The illustration is from a photograph of the chimney erected for Messrs. Clarke & Clarke, Limited, leather manufacturers, at their plant at Christie street and the C. P. R. tracks, Toronto.

During the thirty years that the Heinicke Company have been in business they have built more than 6,000 stacks in various parts of the world. The most conspicuous building of its kind, the world's highest chimney, was built by the firm at Halsbruecke, near Freiberg (Germany). This chimney will most likely hold the record as the most slender building (460 feet high, having only 8 feet width at the top), even if a higher chimney may be erected. The company manufacture their own brick, thus having assurance as to its quality and avoiding the open market.



Radial brick chimney at the Clarke & Clarke plant, Toronto

An interesting address on railway development in Canada was given recently at Toronto by Mr. A. S. Goodeve of the Dominion Board of Railway Commissioners. He traced at some length the various stages in the Canadian railway situation from the time when the Champlain and St. Lawrence Railway, forty-six miles in length, was first built in 1832, till the present day when, with 26,500 miles of track and 8,000 miles in terminals and yards, we still consider we are but at the beginning of things.

Vitrified Segment Sewer Block

The American Sewer Pipe Company, Akron, Ohio, has perfected and placed on the market a vitrified, salt glazed hollow clay block for use in the construction of sewers of large diameter. This type of construction permits the use of smooth, impervious material for sewers of larger diameter than are practical with the use of vitrified sewer pipe, while the joints are few and are so arranged that they produce practically no break in the completed sewer. In this type, the end joints of the block have an annular space formed by longitudinal over-lapped webs, which, when well cemented, render the joints water-tight. The sides of the block are of the ordinary male and female construction, corrugated, which forms the longitudinal joint when assembled. This dove-tailing, both laterally and longitudinally, when thoroughly cemented, offers great resistance against either internal or external pressure.

The blocks are laid in alternate rows, all joints being made to allow a proper space for cement mortar in erecting. The blocks are made in two-foot lengths and are hollow webbed, thus securing maximum strength with a minimum of material. Each block has four cellular spaces formed by longitudinal webs, which, when the sewer is erected, form a continuous hollow space, providing both a surface and an under drain, which is found very effective during construction where water is encountered in excavation, doing away entirely with the necessity of separate under drains. These block are furnished for sewers ranging in size from 30 to 108 inches, and are constructed of Akron shale and Ohio River fire clays, thus giving a new form of construction for large sewers as durable and impervious to the action of acids and sewage as vitrified sewer pipe. The frictional resistance to the flow of water in segment block sewers is considerably less than in any other form of construction, while at the same time the load-carrying capacity is greater than that of any other material now used in the construction of sewers.

British Clay Machinery

One of the oldest British firms making clay-working machinery is Thomas C. Fawcett, Limited, Leeds, England, represented in this country by the Canadian P. J. Mitchell Company, Ltd., 30 St. Francois Xavier street, Montreal. The Fawcett Company manufacture a great variety of brick making machines, fitted with patent devices, and suitable for various grades of brick. The machinery and plant includes that for producing common building, engineering, and the best class facing bricks from shales, marls, colliery refuse, &c., and also for manufacturing plastic bricks, common and facing, from strong clays and marls, upon the wire-cut principle; sand stock moulding machinery, sand face presses, &c.; and special machinery for fire brick, furnace blocks, sanitary pipe and retort making.

The Canadian P. J. Mitchell Company are also agents for the Garrett patent four and six ton superheated steam wagons. These are of English make, and are always in stock. The company advise that steel tyred wheels of special design be used for the 6 ton wagons, owing to the high cost of rubber on such rough, uneven roads as we get in Canada. The steel tyred wagon is restricted in speed to six miles an hour, whereas a rubber-tyred vehicle can be run as high as 12 miles an hour. This is the only advantage of rubber tyres, but it is one which does not offset the excessive maintenance cost of rubber tyres. All the four ton wagons are fitted with rubber tyres. It is generally admitted that for the carriage of heavy goods and materials such as bricks, clays, &c., the steam wagon is the most economical form of haulage, the six ton wagon being equal to twelve horses. In an independent trial made of the Garrett wagon, the distance travelled was 49.59 miles, with a load of 12,000 lbs., the coal consumption being 0.925 lbs. per net ton mile.

Stiff-plastic Method of Brickmaking

The method of machine brick-making may be divided into three classes or processes viz: Stiff-plastic, Dry Press, and Plastic or Wire-cut. The two former may be said to work on similar lines i.e., the material, shales, or marl, are ground through perforated pan mills or disintegrator, elevated to a sieve of the revolving or flat type, screened to a fineness of 8 to 12 meshes per inch, and fed to hopper of machine. So far, the processes are identical. In the method of pressing the bricks, however, there is this important difference viz. the moulds of the dry press being fed by gravity, limit the quantity of water which may be added to 5 per cent or 6 per cent. Any excess causes the pulverized material to "hang" in the hopper and resulting in partially filled moulds.

In the stiff-plastic machine, the ground material, which is previously tempered in a mixer with 10 per cent to 12 per cent water, is fed into the moulding drum with a "pug-screw" under great pressure, the result being a perfectly homogeneous "clod," which is automatically passed to a press mould to receive a finishing pressure. For many years the dry press process practically held the field in England, but the porosity, lack of strength and general poor quality of bricks gradually caused the process to be discarded in favor of the stiff-plastic process. Bricks made from the latter give infinitely better results on crushing, absorption and weathering tests, and find great favor amongst architects in England for public buildings, water works, railway and general engineering work.

The finest facing bricks of the Accrington district are produced by the "Fawcett" stiff-plastic press. The firm are also makers of dry press wire cut and soft mud plants, patentees of continuous kilns, etc. Established over fifty years, they have made some thousands of brick-making machines for all parts of the world.

An Attractive Show Room

The Black Building Supply Company, Limited, have furnished materials for a number of the representative buildings erected during the past season in Toronto and vicinity, including Northwestern Terra Cotta for the Canadian Pacific, R. S. Williams, Bowles, McAuliffe & O'Brien Buildings and the Tremont Hotel. They also specialize in high grade paving and face brick and have developed a growing business in these lines for all classes of building and fireplace work. A visit to their showroom in the Mail Building, where a number of the lines of brick they handle are very artistically arranged, will well repay those interested in high class brick and terra cotta work. During the past season they have erected a number of Heinicke radial brick chimneys. They also report a growing demand for Messrs. Toch Brothers' waterproofing preparations which are now manufactured in Toronto.

An effective display of high-class brick in the show room of the Black Building Supply Company, Limited, Toronto

The Foundation Company, Limited, Montreal and Winnipeg, have done a large amount of work in the West during the past year. For the Pitt River Bridge, of the C.P.R., near Coquitlam, B.C., the company are building 11 piers and two abutments, the bridge being for a double track. Four open concrete caissons will be carried down to about 90 feet below water level, and the balance of the piers and abutments will be on piles. The C.P.R. Red River Bridge at Kildonan, Man., is of the double track type, and the Foundation Company are constructing seven piers and two abutments. Five piers will be carried on cylinders sunk to a depth of 45 feet below water level, and the other two piers and abutments will have pile foundations.

Sydney Pressed Brick Company

The Sydney Pressed Brick Company is manufacturing what may be described as artificial stone from granulated blast furnace slag and a small percentage of slag cement. The granulated slag is obtained in railway hoppers from the Dominion Iron & Steel Co. Part of the moisture is driven out of the slag in a rotary dryer and the proper proportion of cement is then added. The slag and cement are thoroughly mixed and ground together and pressed (damp) in a machine such as is used in the manufacture of sand-lime bricks. From the press the bricks are taken on small iron trucks to a curing cylinder in which 20,000 bricks are cured for eight or ten hours in steam at about 100 lbs. pressure.

On coming from the curing cylinder the bricks have a good ring and are fit to be used. They, however, go on hardening for an indefinite time, and are improved by exposure to weather and changes of climate. They make an exceptionally strong bond with cement mortar. A wall built of these bricks laid in cement mortar is practically monolithic. The bricks are quite free from warp and very accurate in dimensions. The dimensions are 8 3/16 in. x 4 in. x 2 3/16 in.

The company manufactures light grey, red and yellow bricks. The new general office building of the Dominion Iron & Steel Company is built of Sydney red bricks. Various commercial, industrial, educational buildings, and dwellings in Sydney and elsewhere furnish very attractive examples of this new building material.

The output of the whole plant is 20,000 bricks per working day of ten hours.

An Up-to-date Catalogue

One of the most complete works of its kind we have ever seen, and which certainly shows the progressiveness of the concern from which it emanates, is the General Catalogue No. 1 of the General Supply Company of Canada, Limited, Ottawa, a copy of which we have received.

The lines illustrated and described include power transmission, elevating and conveying machinery, iron and wood working machinery, steam goods and miscellaneous supplies.

The catalogue consists of over 1100 pages, printed on coated paper and well bound in cloth cover. Throughout the catalogue the compilers have adhered to standard lists thus enabling purchasers to make an intelligent estimate on the net cost of the material wanted.

It is not only a catalogue: it is a work of information which every mill man and dealer in mill supplies will find of great benefit. With this catalogue in his possession a mill man, contractor or engineer can find everything he needs to fit his mill, woodworking or machine shop plant from top to bottom.

This firm makes a specialty of furnishing all classes of machinery, boilers, engines, steam and power pumps, accessories and supplies for mills, factories, machine shops and contractors, and are also sole representatives for the well known brands of belting, "Vi-Balata" and "Dreadnought," which are becoming so popular among mill men all over Canada.

The General Supply Company was incorporated in January, 1906, and has had a most successful career under the able management of Mr. G. B. Greene. In 1910 the present substantial and spacious building in Ottawa was recognized to be an absolute necessity. The building is four storeys high, built entirely of steel encased in concrete, and is strictly fireproof. The floors have a carrying capacity of 1,600 pounds per square foot and are constructed of reinforced concrete. The roof and foundation are also of the same material. The walls are 18 inches thick and are so constructed that at any time four extra storeys may be added without endangering the safety of the building.

The ground floor is used for shipping office, shipping room and for the storage of heavy machinery. A very strong trolley, capable of handling four tons, and operated with ease by one man, is erected on this floor and is a great time and labor saver in moving heavy machinery. The front portion of the first floor is entirely taken up with the large general offices, board room, manager's office, drafting room, blue print room and vault, while the rear portion is utilized as a store room. The top floor is used entirely for the storage of the many lines of goods handled by the company.

Besides the head offices at Ottawa, the company has branch offices and warerooms at Toronto and Winnipeg where full stocks are always kept on hand.

Personal Mention

Mr. Fred K. Irvine, editor of Rock Products, Chicago, was one of those who attended the recent annual convention of the Sand-Lime Brick Association in Toronto.

Mr. W. D. McFarlane, of the Winnipeg Sand-Lime Brick Company, was in Toronto recently, attending the convention of the Sand-Lime Brick Association.

Mr. William A. Ryan, an old Toronto resident, passed away recently. Mr. Ryan spent all his life in the city, being connected with the Toronto & Nipissing Railroad for eighteen years, and twenty years with the Toronto waterworks.

Mr. T. S. Ingersoll of Minneapolis, is in Edmonton to form a local exchange to be affiliated with the National Association of Real Estate Exchanges. The parent organization will meet in Winnipeg next June, when it is expected that more than 100 cities in the United States and Canada will be represented by delegates.

Mr. W. H. Freeborn, of Brantford, Ont., president of The Canadian Clay Products Manufacturers' Association. A contributor to this issue.

Mainly Constructional

The News in Brief—From the Atlantic to the Pacific.

The cost of good roads in the township of Welland, Ont., has been estimated at $2,700 per mile.

Negotiations are under way for the erection of a sanitorium to cost in the neighborhood of $200,000 near the town of Young, Sask.

Since the city initiated its large street paving program a year ago last spring there have been laid upon the streets of Victoria nearly fifty miles of pavement.

Building permits for November in Victoria amounted to $788,505 as against $616,525 for the same month in 1911. The figures for the first eleven months in 1912 are $7,334,315.

Plans have been completed for the new post office at St. John, N.B. The structure will be 74 feet high above the street, four storeys high and two frontages 161 and 110 feet.

By-laws for sums amounting to over $5,000,000 were recently passed at Vancouver for expenditure in 1913. These figures will likely be largely increased prior to the end of the year.

The matter of the construction of a $300,000 stadium recently came before the Board of Park Commissioners of Vancouver. A further discussion of this subject will take place shortly.

The Pelham Park Improvement Company, Limited, has been incorporated with a capital of $1,000,000 to erect buildings and deal in all kinds of building materials, with head office at Hamilton.

It is expected that Vancouver's permits for 1912 will considerably exceed the $20,000,000 mark, the total at the end of November being $17,858,057, as against $17,652,642 for the whole of 1911.

Mr. E. Adamson, of Montreal, is preparing plans for a big hotel in the city. It will be ten storeys, of steel and concrete construction, and will accommodate 300 guests. The site is on Stanley street, and cost $178,500.

Mr. Thos Turnbull, Building Inspector of New Westminster, B.C., reports the following building permits for that city: November, 1912, $61,720; November, 1911, $62,250; eleven months, 1912, $1,579,368; eleven months, 1911, 1,063,687.

Plans and specifications are being proceeded with for the new public buildings for Brantford, Ont. There will be two frontages, 125 and 110 feet and the extreme height will be 60 feet. Stone will be used throughout The cost will be from $250,000 to $300,000.

The Lewis and Clark Steel Corporation, of Tacoma, Wash., are contemplating the erection of a ten million dollar plant at New Westminster, B.C. The company deals largely in coal, mineral, lime, etc., and their manufactured products, and would require two hundred acres of land, with marine and railway facilities.

Following the example of the Harbor Commission of Montreal, the Quebec Harbor Commission has notified the different railway companies that after the first of May next, it will do all the car shunting required on its own wharves and docks. For this purpose the commission has placed an order for three locomotives in Montreal

Work has been begun on the planning of the city of Ottawa according to the lines agreed upon by the Dominion government and the city last summer The plans are to be prepared by Mr. N. Cauchon and instructions have been given to allow this engineer the use of records he may need in the public works department, Georgian Bay canal surveys, chief architect's records, department of railways and canals, department of interior, records of the geographer, department of militia and the conservation commission. The plan will cover roughly 100 square miles.

It is reported that the Dominion Bridge Company will absorb the National Bridge Company, Longue Pointe, P. Q. The terms involve the guarantee by the former of the interest of the $560,000 National Bridge 6 per cent. bonds, while the stock of the two companies will be exchanged at the ratio of one of Dominion for four of National.

The Silicate Brick Company of Ottawa, Limited, manufacturers of sand-lime brick, have been having a good run of business and report conditions excellent. The manager of this progressive firm is Mr. H. F. Allardice, a brick man of long experience, formerly with Messrs. Barnett & McQueen, Fort William. The superintendent is Mr. B. W. Campsall, who has had an extended connection with the industry.

The Maisonneuve, P.Q., City Hall, built of smooth faced granite, is now completed. The building is square, possesses many large windows, and is decked in front with large Corinthian pillars, which give it a distinctive appearance The interior is of an entirely modern type, possessing a huge rotunda on the first floor, from which run the stairs leading to the offices in the basement, and those leading upstairs. On all sides of this corridor are the more important offices of the city administration.

Montreal capitalists are interested in a plan to establish big cement works on the line of the Intercolonial Railway near St. John, N.B. Their engineers have already inspected the properties, and it is understood that their report was extremely favorable. While the plans are not yet completed, if those which are now under consideration are carried out, it will mean the establishment of a new town at the site of the industry, as the work should furnish steady employment for at least 500 men.

The Blystone Machinery Company, of Cambridge Springs, Pa., are publishing an interesting monthly bulletin called "The Pepper Pot," which is sent to agents and others interested. The Blystone—"The Mixer with a Record" is familiar to many progressive readers of this journal. The Blystone hand truck mixer has been used very successfully on sidewalk and foundation work. A full line of these mixers is carried by Messrs A. R Williams Machinery Company, Limited, Toronto, the sole distributors for Canada

Messrs. Sharpe & Thomson, architects, Victoria, were awarded first place in the competition for plans for the various buildings of the University of British Columbia The second in order of merit was Mr D S Bow, of Vancouver, while the third and fourth designs were submitted by Messrs. Philip J. Turner and partners, Montreal, and Messrs Symons & Rae, Toronto The prizes attaching to the respective positions are $4,000, $3,000, $2,000 and $1,000 The ultimate expenditure upon the group of buildings is estimated at $10,000,000 Last session the sum of $500,000 was appropriated by the Legislature for the actual commencement of the work

The Time, The Place and the Occasion

The Time—Jan. 14-17, 1913.

The Place—Prince George Hotel, Toronto.

The Occasion—Annual Convention of the Canadian Clay Products Manufacturers' Association.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from **Architects, Contractors, Engineers, etc.**

Waterworks, Sewerage and Roadways

Ashcroft, B.C.

The Ashcroft Water & Electrical Co. is planning erection of 3 reservoirs to store approximately 124,800 acre ft. of water in connection with hydro-electric improvements, to be built at Bonaparte Lake, Young Lake and Leon Lake.

Berlin, Ont.

Pavements. Mayor, W. H. Schmalz. Clerk, A. H. Miller. By-law passed providing for tarvia pavements on Park and Allen streets with cement curb and gutter, also walk on Park street.

Sewer, Alexandria street, planned by town council. Mayor, W. H. Schmalz. Clerk, A. H. Miller. By-law passed.

Burnaby, B.C.

Extension to waterworks system planned by Municipal Council. Clerk, Arthur G. Moore. Engineer MacDonald. Consulting engineers, Cleveland & Cameron, Rogers Bldg., have submitted estimate as follows: 3-in., 4-in. and 6-in. pipe and hydrants, $50,000, 10-in. alt supply main, $25,000; 8-in. general distributing pipe, $63,000; 300,000 gal. tank with site, $33,000; additional pumping unit, $2,000; 10-in. main to Capitol Hill reservoir $4,400; extension to Capitol Hill, $35,000; low level reservoir at Aidley, $20,000.

London, Ont.

Road improvements. Cement curbs and gutters contemplated by City Council. Engineer, H. A. Brazier. Plans in progress.

Melville, Sask.

Sewage disposal works to cost $175,000 planned by town council. Mayor, C. L. Franks. Sec.-treas., F. H. Clarkson. Committee have been appointed to investigate systems in other towns and submit report. By-law to be submitted in Jan. 1913.

Ottawa, Ont.

2 additional pumps required (worked by water turbines), capacity 4,000,000 gallons per day. Clerk, Jno. Henderson. Engineer, Wm. Storrie, City Hall.

Point Grey, B.C.

Hydrant fittings—valves, special castings and hydrants to be used in water supply installations. Plans and specifications at office of clerk, G. C. Heighway, Kerrisdale, who will receive tenders until Jan. 6.

Red Deer, Alta.

Road machinery contemplated by the town council. Mayor, R. B. Weller has asked council to purchase rock crusher and road roller. Sec.-treas., A. T. Stephenson.

Richmond, Que.

Road improvements to cost $25,000 planned by Corporation and Council. Will macadamize road, 1 stone crusher and steam roller required. Mayor, Mr. Hudon.

Ridgetown, Ont.

Extensions to watermains to cost $5,000 planned by town council (Water Commissioners). Chairman, Robert Hall. A by-law will be submitted to ratepayers.

Winnipeg, Man.

Waterworks distribution system, cost $50,000, planned for Rural Municipality of St. Vital. Clerk, G. J. Charette. By-law to be submitted on December 23.

Turbines for stand-by plant. Specifications at office of engineer. Tenders received by secretary until Jan. 15, 1913. Sec., M. Peterson. Engineer, H. N. Ruttan, 213 James avenue.

Following local improvements are under consideration of the Board of Control. Sec., M. Peterson. Engineer, H. N. Ruttan, 223 James avenue. 4 ft. 8 in. plank walk on Merrion, McKenzie and Oxford streets; asphalt No. 2 24 ft. pavement on Jessie avenue, Lilac to Amelia, $13,004. Asphalt No. 1 on Carlton, Portage to Graham, $6,342; on lane between Portage and Graham, Donald and Smith, $4,424; on Johnson avenue, Kelvin to Levis, $49,348; granolithic walks 4 ft. on McMicken and Sargent, $880; sewers in Rathgar and Campion, $2,639.

CONTRACTS AWARDED

Toronto, Ont.

Storm overflow sewer to cost $11,000, Walmer road. Board of Control. Chrm., Mayor H. C. Hocken. General contractor, Commr. R. C. Harris. Brick and concrete construction.

Sewers. Board of Control. Chairman, Mayor H.C. Hocken. Commissioner of Works, R. C. Harris. Contract awarded to Dunne & Co., 148 Clinton street. Clinton avenue $537; M. H. Murphy, Peterborough avenue, $1,078; J. H. McKnight Construction Co., 152 Bay St. McFarland avenue, $1,095; Commissioner of Works, City Hall, Plymouth ave., lane 1st E. Markham street, lane 1st S. College street, lane W. Yonge street, Conduit street, $4,585.

Winnipeg, Man.

Pump houses to cost $21,250. General contractor, K. C. Sutherland, 655 Selkirk avenue; 17 pump houses required in extension of water works system. Bd. of Control. Sec., M. Peterson. Engineer, H. N. Ruttan, 223 James avenue.

Railroads, Bridges and Wharves

Bassano, Alta.

Bridge. Prov. Govt., Dept. of Public Works. Dep. Minister, John Stocks, Edmonton. Council has appointed committee to wait on Prov. Govt. at Edmonton with a view to the early erection of a bridge over the Bow River and the Red River.

Brantford, Ont.

Dykes, etc., cost $15,000, planned by City Council. City Clerk, H. F. Leonard. Ratepayers will be asked to vote on by-law January 7, 1913.

Twp. Brighton, Ont.

Bridge. C. L. O. & W. (C.P.Ry.) Co. have been authorized to construct bridge on its Glen Tay to Cobourg line across C.N.O. Ry. in Lot 28, Con. B., Twp. Brighton, mileage 95.1 from Glen Tay.

Edmonton, Alta.

Street Railway extension. Railway Inspector John Moir's plan to build belt line system 110 miles long has been accepted by city council; 200 cars will be required. Clerk,, F. M. C. Crosskill. Engineer, A. J. Latornell.

Fort William, Ont.

C. P. Ry. Co. have been authorized to construct extension to branch line for The Fenton Elevator Co.

Granite, B.C.

Bridge. Prov. Govt., Dept. of Public Works, Engr., J. E. Griffiths, Victoria, has issued instructions for immediate erection of the new high level traffic bridge at Granite in the Similkameen; 2 buttresses with concrete foundations, 240 spans and one 125 ft. span in the centre.

Twp. of Himsworth, Ont.

G. T. Ry. Co. have been authorized to construct siding and spurs for the Dom. Wood & Lumber Co. Ltd., Lot 25, Con. 1, Twp. of Himsworth, Dist. Parry Sound, Ont.

Twp. of Humberstone, Ont.

The Empire Limestone Co. Ltd., have been authorized to construct tunnel under the siding of Carroll Bros. on Lot 5, Con. 1, Twp. of Humberstone, Co. Welland, Ont.

Leamington, Ont.

Breakwater under consideration of the Dominion Government, Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. A petition will be presented to the government asking that a breakwater be constructed. Further particulars from R. M. Selkirk, Town Clerk.

London, Ont.

Surveys will start at once for new radial lines between London, St. Mary's, Sarnia, Chatham and Windsor, and important extensions made to the hydro-electric system in a number of places in the district. Interested, Hon. Adam Beck, 169 Albert street.

Meadowside, Ont.
C. N. Ry. Co's location of station at Meadowside Ont., has been approved.

Milner, Man.
Spur. C. P. Ry. Co. have been authorized to construct spur into the premises of the Northern Sand & Gravel Co.

Montreal, Que.
C. P. Ry. Co. have been authorized to construct spur for the Standard Chemical Iron & Lumber Co. of Canada, Ltd.

Additions to railway shops of C. P. Ry. contemplated. Gen. Supt., Lacey R. Johnson. Additions include large shop for erection of steel cars and a brick drying shed for lumber. Plans will be prepared.

Moose Jaw, Sask.
G. T. P. Branch Lines Company's location of Moose Jaw Northwest Branch from mileage 67.86 to 79.02 has been approved.

Twp. of Moulton, Ont.
G. T. Ry. Co. have been authorized to construct siding for the Dunnville Brick & Tile Co., Twp. of Moulton, Co. Haldimand, Ont.

Oakville, Ont.
Station contemplated by Grand Trunk Railway Co. Supt., J. J. Beck, Union Station, Toronto. Plans will be prepared.

Portage La Prairie, Man.
Railroad. Plans have been filed with council for C. N. Ry. cut-off line to run from Portage la Prairie to Morris to connect with the line to Port Arthur via Emerson and Sprague.

Providence Bay, Ont.
Wharf (extension) Manitoulin Island. Tenders received by secretary, R. C. Desrochers, Ottawa; Dom. Govt., Dept. of Public Works, until Jan. 7, 1913. Plans, etc., at office of J. G. Sing, dist. engr., Confederation Life Bldg., Toronto; H. J. Lamb, dist. engr., Windsor, Ont.; Postmaster, Providence Bay, and at Department, Ottawa.

Regina, Sask.
Railroad (branch). C. N. Ry. Company's location of railroad through Twp. 26, R. 7 W. 3 M. from mileage 54.05 to 61.32 has been approved.

Railway planned by Syndicate Representative, J. G. Bayden has made application to the Prov. Govt. for charter to construct interurban railway between Regina and Moose Jaw

Parish of St. Felix de Valois, Que.
C. P. Ry. Co. have been authorized to construct spur for Alex. Bremner Ltd. on lot Codastrac, No. 125, Parish of St. Felix de Valois, Co. Joliette, Que.; mileage 14.83 from Lanoraie, Que.

St. Johns, Que.
G. T. Ry. Co. have been authorized to construct siding and spur for the Canada Grip Nut Co., Ltd

Ville-Marie, Que.
Public wharf Dom Govt., Dept. of Public Works, Sec., R. C. Desrochers, Ottawa Tenders received by Sec until January 7th. Specifications, etc., at offices of J. L. Michaud, Dist Engr., Merchants Bank Bldg., Montreal; Postmasters at Ville-Marie, Haileybury, Ont., and North Bay, Ont., at Dept., Ottawa, and MacLean Daily Reports, Toronto and Montreal.

Twps. York and Scarboro, Ont.
Railroad (branch). C. N. O. Ry. Co.'s location of road through Twps. York and Scarboro, York, Ont., from mileage 0 to 7.60 from Yonge street has been approved.

CONTRACTS AWARDED

Edmonton, Alta.
Substructure bridge, cost $79,000, 5th street. Clerk, F. M. C. Crosskill. Consulting engineer, A. J. Latornell, General contractors, Lyall-Mitchell Co., Union Depot, Winnipeg. For substructure of 5th street bridge across Saskatchewan River, three spans 234 ft., width 32 ft.

Erieau, Ont.
Round house, coal chutes and 2 store buildings to cost $50,000 for the Lake Erie Coal Co.; also concrete piers to cost $20,000. General contractor, Geo. Morgan. Mechanical equipment required for coal chutes, tools and machinery for round house, electric lighting. Work to start at once.

Grand Forks, B.C.
Bridge to cost $13,000. Prov. Govt., Dept. of Public Works, Engineer, J. E. Griffiths, Victoria, has issued instructions for immediate erection of the new Cooper Bridge spanning the main Kettle River near Cooper Bros.' ranch. To be built by day labor.

Pitt River, B.C.
Subway, cost $45,000, near Coquitlam, for C. P. R. General contractors, T. R. Nickson & Co., 1901 Georgia street, Vancouver, B.C. Work will start at once.

St. Catharines, Ont.
Railway extension for C. N. Ry. (Niagara, St. Catharines & Toronto Division) Supt., W. Robertson. Purchasing agent, Mr. Wilson, St. Catharines. Work is being done by company. Company have secured sanction of Railway Board to cross G. T. R. tracks.

St. John, N.B.
Substructure bridge to cost $50,000, Reversing Falls. Prov. Govt. Dept. of Public Works. Chief Commr., Hon. J. Morrissy, Fredericton Govt. Engr., A. R. Wetmore. General contractor, Joseph McVay & Son, St. Andrews, N.B. Tenders for superstructure to be called soon

Public Building, Churches, Schools, etc.

Aylmer, Ont.
Armoury planned by Dominion Government, Dept. of Militia & Defence Secretary, E. F. Jarvis, Ottawa Major Brown has charge of matter

Dauphin, Man.
Moving picture theatre, cost $3,000, is planned for E. J. Hunt 25 x 90 Excavating started

Fort William, Ont.
Armoury, cost $80,000, Walsh street, is planned by the Dominion Government Dept. of Militia and Defence Secretary, E. F. Jarvis, Ottawa

Guelph, Ont.
Fire hall, cost $15,000, planned by City Council. Clerk, T. J. Moore. Additional apparatus required. By-law will be submitted.

Addition to Collegiate under contemplation of the Board of Education, who may decide to erect new building. Chairman, H. R. Steele.

Hamilton, Ont.
Schools. The Board of Education plan to build a new 20-room school east of Ottawa street, and also an 8-roomed addition to Hess street school. Architect not yet chosen. Secretary, R. H. Foster.

Melville, Sask.
College, cost $20,000, for Evangelical Lutheran Joint Synod. Trustees, Rev. Geo. Gehrke, 667 William ave., Winnipeg. Rev. L. F. Tank, 607 Bannatyne ave., Winnipeg; John Brodt, Regina; H. Schmidt, Newdorf; Jno. D. Miller, Melville. Architect, Edgar Prain, 313 Fort Street, Winnipeg, is preparing plans. Brick construction.

Vancouver, B.C.
Y. M. C. A., cost $350,000, Georgia & Burrard streets. Architect, H. S. Griffiths, Dominion Trust Bldg. Eight stys., reinforced concrete, structural steel and pressed brick construction. Plans and specifications at office of architect. Separate and bulk tenders received by owners until December 23, 1912. Separate tenders invited for excavation and concrete, structural steel, brickwork and terra cotta, marble and tile, roofing and sheet metal, elevators.

Winnipeg, Man.
Addition to theatre, cost $6,500, Main street, for Colonial Theatre Co., Main street. Architect, A. Melville, Builders' Exchange, Portage ave. Two storeys, 25 x 27, brick foundation and construction. Foundations in.

CONTRACTS AWARDED

Melville, Sask.
Town Hall, cost $55,000. Secretary-treasurer, John Crow. Architects, Storey & Van Egmond, Regina General contractors, Melville Construction Company. Furniture and seating for auditorium to seat 750 people required.

Montreal, Que.
Post office, cost $200,000, Ontario St., Dominion Government, Dept. of Public Works Secretary, R. C. Desrochers, Ottawa Architect, C. A. Reeves, 58 St St. James street, Montreal. General contractors, A. Gratton, 138 Third ave., Viauville, Que.

Toronto, Ont.
School, cost $60,000, Pauline ave. Board of Education Sec.-treas., W. C. Wilkinson, City Hall Architect, F. E. Belfry, City Hall Heating and ventilating, Keiths Ltd., 111 King street west, $[illegible] Plumbing and electric work, Fred Armstrong Co., Ltd., 277 Queen street west, $961

School, cost $60,000 Keele and Conduit street Sec.-treas., W. C. Wilkinson City Hall Architect, F. E. Belfry City Hall Mason, H. Lane & Son, 111 Havelock street, $[illegible] Carpenter, Frank Armstrong, 89 Oak street, $16,[illegible] Roofing, Geo. M. Bryson, [illegible] Yonge St. $950 Painting, [illegible] Plumbing, [illegible] Yonge street, $1,850 Terra cotta, Kahl

Bennett, Kingston road, $4,774. Plastering, W. J. Haddock & Son, 792 Crawford street, $[illegible].

Vancouver, B.C.

Theatre, cost $300,000, Pender St. near Burrard, for E. K. Ricketts, 1075 Barclay street. General contractor, Edward J. Ryan, 768 Granville street. Four stys., reinforced concrete construction, seating capacity 2,500.

Schools planned by Board to be erected on Victoria street, Ferris Road, 61st ave. and Ferguson Road. Mill construction, buff pressed brick faced, stone trimmed, slate roofing, hot air heating, fan system of ventilation will also be installed. Secretary, C. W. Murray. Architect, J. H. Bowman, 615 Pender street W. General contractors, McPhalen Bros., 282 7th ave. west.

Business Buildings and Industrial Plants

Aylmer, Ont.

Extension to harness shop for R. R. Caughey. Plans will be prepared.

Burnaby, B.C.

Mill. The New Westminster Lumber & Woodworking Co. will erect two mill buildings at 6th and 14th ave.; one 40 x 60, the other 60 x 120.

Calgary, Alta.

Warehouse to cost $85,000, 11th ave. E. for Massey-Harris Co., Calgary. Engr., D. S. McIlroy. 4-sty., 100 x 130, cement foundation, brick construction. Plans ready; excavation started.

Cobalt, Ont.

Plant to cost $3,000,000 for The Riordon Pulp & Paper Co. Ltd., 1 Beaver Hall Square, Montreal. Managing Director, Carl Riordon. Plans will be prepared.

Comber, Ont.

Canning factory under contemplation for the Dominion Canners, Limited, head office Aylmer. Manager, David Marshall. Plans will be prepared and work started next spring. Equipment required.

Edmonton, Alta.

Business block planned for E. E. Hewson, Amherst, N.S. To be build in spring on site recently purchased.

Bank building is under contemplation for The Bank of Edmonton. Solicitor, E. S. McQuaid, 124 McDougall avenue. Company will be incorporated at next session of Parliament. Bank financed by British capitalists.

Essex, Ont.

Garage will be erected on Talbot St. for A. W. Wood. Site purchased, plans to be prepared.

Guelph, Ont.

Two stores, Wyndham street, for L. E. Cowan, Suffolk street. Two storeys, brick or cement construction. Plans in progress.

Lethbridge, Alta.

Warehouse under contemplation for The Massey-Harris Co., head office, Toronto, who have purchased site on 11th street. Plans will be prepared.

London, Ont.

Garage and repair shops for London Motor Sales Co. Manager, Charles Abbott, 136 Richmond street. 120 x 60, concrete and steel construction. Plans will be prepared.

Melville, Sask.

Flour mill contemplated for The Dominion Milling Co. Ltd., c/o John Rowan. Capacity 300 bbls. per day. Plans in progress.

Montreal, Que.

Alterations to office building, 26 Hospital street, for Robert Redford, 25 St. Sacrament street. Architect, The House of Browne, Ltd., St. James street. 5-sty. Plans in progress.

Stores and public halls to cost $6,600 for Z. Lavoie, 879 Ontario E. Architects, Benoit & Girard, 130 Westminster avenue W. 3-sty., 41 x 80, brick veneer construction, stone foundation. Plans drawn.

Ottawa, Ont.

Addition and extensions to factory, cost $15,000, Armstrong street, for Dominion Wire Cloth Mfg. Co., c/o J. R. Buchanan, president, Armstrong street. Plans will be prepared.

Peterboro, Ont.

Factory, cost $60,000, considered for Henry Hope & Son, Birmingham, Eng. Company have been granted free site by city and will manufacture supplies for fireproof buildings. Steel sash, door and window frames, etc. Plans will be prepared.

Toronto, Ont.

Garage for Geo. Nicholson, 6 High Park Gardens. Brick construction. Plans drawn.

Store and residence, Boon and Danby avenue, for Wm. Osborne, 94 Hope ave. 2-sty., brick construction, stone foundation. Plans drawn.

Addition to store and residence, cost $2,500, for R. Gray, 1521 Dundas street. Architect, P. H. Finney, 79 Adelaide St. E. Brick construction and foundation. Plans drawn.

Office building contemplated, S. E. cor. Bay and Temperance streets, for The Legal & Financial Corporation Ltd. Solicitors, Messrs. Beaty, Snow & Nasmith, 2-4 Wellington street. 12-stys., brick and stone foundation, brick construction, fireproof floors. Plans in progress.

Vancouver, B.C.

Factory. The American Can Co., Chicago, Ill., will erect large plant to manufacture cans by machinery.

Warehouse and office to cost $100,000, Yukon and Front streets, for The B. C. Telephone Co., 555 Seymour street. Plans prepared and tenders will be called shortly.

Stores and apartments, cost $80,000, Robson and Thurlow streets. Architect, Emil Guenther, North West Trust Bldg. Five storeys, brick construction. Tenders called.

Warehouse to cost $16,000, Alexander street, for Brown & Howey, 129 Cordova street E. Architects, Braunton & Leibert, 142 Hastings street W. 2-sty., 50 x 90, brick and mill construction. Plans in progress. Work will start soon.

Wallaceburg, Ont.

2 stores for John Clark, Dresden. 2-sty., brick construction. Plans in progress.

Woodstock, Ont.

Bakery, Ingersoll ave. and Riddell St. planned for A. Waghorne, Wellington street. Tenders for building to be called in spring. Two storeys, 60 x 60, brick construction. Store and shop fittings, baking machinery required.

CONTRACTS AWARDED

Brantford, Ont.

Addition to brewery, Alfred street, for Bixel Brewing Co. Ltd., 18 Alfred street. Builder, Jesse Asher, c/o owner. Cooling room, 1-sty., 26 x 15, cement foundation, clay brick construction, shingle and asbestos roofing.

Calgary, Alta.

Stores, cost $5,000, 4th street east. Owner, architect and general contractor, J. H. Garden, Garden Crescent. One sty., 50 x 50, frame, cement foundation. Excavating done.

Rooms and office, cost $6,000, for Mrs. C. Adams, c/o Gutmans, David Block. Builder, H. Moore, Travis Block. Two storeys, 30 x 60, cement foundation, brick construction. Excavating done.

Hudsons Bay Company's new departmental store, L. K. Comstock & Company, contracting engineers, 628 Confederation Life Bldg., Toronto, and Montreal, have the contract for entire mechanical and electrical equipment. Part of work has been sublet to Evans, Almirall & Co., of New York, and also to Babcock & Wilcox & Co., Montreal. Engines supplied by Robb Engineering Co. Generators by Canadian Westinghouse Co. Pumps by Smart Turner & Co., Hamilton, and the Goulds Pump Co. of Toronto. The electrical work in the Calgary Herald Bldg., and the Canada Life Bldg., Calgary, has also been awarded to L. K. Comstock & Company.

Hamilton, Ont.

Garage for Mrs. Hurney, Arkledun ave. General contractors, Hysert & Hildreth, 188 Gibson ave.

Foundry and pattern shop, cost $50,000, Sherman ave., for Brown Boggs Co., Victoria and King William streets. Manager, W. E. Blanford. Architects, Prack & Perrine, 36 James street. General contractors, Christman & Co., Main & Hughson streets. One building roofed, brick work up on other.

Warehouse, cost $15,000, Ferguson ave. for Dixon Bros., 66 King E. (fruit dealers). Architect, W. A. Edwards, 2 Hughson street south. Mason, Geo. E. Mills, 614 King street east. Carpenter, R. A. Campbell, 117 Duke street. Three storeys and basement, 100 x 75, brick and structural steel construction. Cold storage equipment required.

Montreal, Que.

Store and residence, cost $3,500. Owner and builder, Emilia Archambault, 1890 St. James. Two storeys, 25 x 40, cement foundation, brick veneer construction.

Alterations to restaurant, cost $4,000, St. James, for Putnam & McCrery, 308 Merchants Bank Bldg. General contractors, J. B. Gratton, Ltd., 80 Mercier ave. Four storeys, 26 x 78, structural steel.

Factory, cost $9,000, Cabot and Hadley, for Canadian Carbonate Co., Ltd., 1680 St. Patrick ave. General contractors, Reid, MacGregor & Reid, Guy street Block. One storey, 125 x 48, stone foundation, brick construction, pine floors, felt and gravel roofing.

Niagara Falls, Ont.

Printing factory, cost $5,000, for F. H. Leslie, c/o "The Review," Erie avenue. Architect, J. U. Collins, 32 Queen street. General contractors, R. Smith & Son. 2 storeys, 50 x 50, brick construction, freight elevators will probably be installed.

St. Catharines, Ont.

Extension to livery stable, cost $3,000, for Sanderson & Newman, 202 St. Paul street. General contractors, Newman Bros., 75 St. Paul street. Two storeys, brick construction, stone foundation, shingle roofing.

Stratford, Ont.

Bank building for Bank of Toronto, head office, Wellington street east, Toronto. General contractor, Wm. Bradshaw. Mason, Wm. Pounder. Stone front, terrazo flooring.

Toronto, Ont.

Addition to factory, cost $3,000, Eastern ave., for A. R. Clark & Co., Eastern ave. Builder, A. Switzer, 216 Withrow ave. One storey, pile foundation, frame and corrugated iron construction.

Store and apartments, cost $15,000, for J. Becker, Gladstone and Dundas. Architect, J. A. Hardy, 164 Bay street. Work is being done by day labor under supervision of owner. Artificial stone and brick construction. Construction started.

Mr. J. M. Cowan, 65 Adelaide St. E., has awarded the following contracts on store on Dundas St. Masonry, Messrs. Wm. Berry & Son. Carpentry, Mr. R. C. Campbell. Plumbing and draining, Mr. Peacock. Also the plumbing and heating of apartments for Mr. H. Goldman on Gloucester street to Mr. P. J. Hayes.

Factory, cost $60,000, King, west of Spadina ave., for M. & L. Samuel Benjamin Co., 421 King street west. Architects, Burke, Horwood & White, 28 Toronto street. Masonry, Holtby Bros., 61 Hepbourne street. Iron and steel, Reed & Brown, 63 Esplanade East. Six stys., brick foundation, brick and structural steel construction.

West Toronto, Ont.

Office building, cost $5,000, Dundas St., for Conger Coal Co. Secretary, R. L. McCormack 6 King street east. Architects, Ellis & Connery, Manning Chambers. General contractors, Gibson, McCormack & Irvin Lumber Co., Vine St. One storey, stone foundation, structural steel construction.

Winnipeg, Man.

Stable, cost $4,000, Derby street. Owner and general contractor, L. Snider, 78 Derby street. Architect, M. Blankstein, c/o owner. 1½ storeys, 32 x 66, brick foundation, brick construction. Foundations in.

Woodstock, Ont.

Extension to factory for the Standard Wire Fence Co. Secretary, E. W. Nesbitt. General contractor, W. J. Taylor 84 x 50, brick and stone construction. Machinery required.

Residences

Calgary, Alta.

Two residences, cost $8,000, for the Consolidated Bldg. & Investment Company, 206 David Block. Two stys., 35 x 19, cement foundation, frame construction. Plans ready and excavating started.

Edmonton, Alta.

Parsonage, cost $6,000, Highlands, for Methodist Congregation. Pastor, Rev. Stephen Bond. Plans prepared. Work will start in spring.

Two apartment houses, cost $300,000, for the Apartments Limited, President, W. J. Magrath, 462 Jasper street west. Manager, W. C. Dunne. Seven storeys, 45 x 120, fireproof construction, one to contain 56 suites with baths, the other 112 rooms with baths. To be modernly furnished and equipped. Plans in progress.

Fergus, Ont.

Residence, cost $4,000, planned for J. Beach, cattle dealer. Work to start in spring. Two storeys, brick construction. Cement basement.

Kingsville, Ont.

Residence, cost $4,200, for T. J. Salmoni. Two storeys, brick construction. Plans prepared.

Leamington, Ont.

Residence, cost $4,000, for W. G. Gidley, Erie street. Brick construction. Plans to be prepared.

Montreal, Que.

Apartment house and roof garden (Crown), Dorchester and St. Matthew, for E. Napoleon Herbert, 21 St. James street, 157 x 160, modern construction. Plans under consideration.

Toronto, Ont.

Two residences, cost $5,000, Priest ave. for E. Morris, 176 Macpherson ave. Brick, stone foundation. Plans drawn.

One pair residences, cost $5,000, for Thos. Lewis, 329 Davenport road. Stone foundation, brick construction. Plans drawn.

Residence, Balsam ave. Owner and builder, Edw. R. Koebel, 43 Bain Ave. 2½ storeys, brick construction and foundation. Plans drawn.

Two pair residences, cost $8,000. Architects and builders, McEwan & Nutter, 52 Coady ave. Brick construction and foundation. Plans drawn.

Residence, cost $3,000, Dearbourne ave., for D. E. Smith, 77 Victoria street (in trust). 2½ storeys, brick foundation and construction. Plans drawn.

One pair residences, cost $5,000, 75-7 Ellerbeck ave. Owner and builder, Jno. Barrett, 88 Borden street. Two storeys, brick construction and foundation. Plans drawn.

Residence, cost $3,000, 917 Logan ave., for W. W. Hiltz, 682 Broadview avenue. Architect, P. H. Finney, 79 Adelaide St. E. Brick construction and foundation. Plans drawn.

Residence, cost $1,500, Pleasant Blvd., for Frank Taylor, 162 Delaware avenue. Architect, W. G. Hunt, 990 Bloor street west. Brick construction, stone foundation. Plans drawn.

Residence, cost $8,500, Wychwood Park, for A. Sullivan, 10 Madison ave. Architect, F. R. Cowan, 202 Crawford St. Brick foundation, brick and cut stone construction. Plans drawn.

Residence, cost $8,000, for Harrison Powell, Indian Trail. Architects, Edwards & Saunders, 18 Toronto street. Brick foundation, brick and cut stone construction. Plans drawn.

Winnipeg, Man.

Residence for Kingsway C. Isbister, 720 McIntyre Block. Architect, J. N. Semmens, 903 McArthur Bldg. 2½ stys., 40 x 40, stone exterior trimmings. Tenders will be called shortly.

CONTRACTS AWARDED

Calgary, Alta.

Apartment house, cost $10,000. Owner and builder, B. Goodwin, 2412 16th St. W. Two storeys, 30 x 60, frame, cement foundation. Excavating started.

Residence, cost $4,500, Elbow Park. Architect and general contractor, G. J. Jack, 231 14th ave. east. Two storeys, 26 x 37, frame cement foundation. Excavating done.

Residence, cost $4,000, Bankview. Architect and general contractor, R. W. Peach, 2622 15th street west. Two stys., 22 ft. x 32 ft. 6 in., cement foundation, frame construction.

Residence, cost $4,500, Elbow Park. Architect and general contractor, J. A. Hay, 1936 11th street west. Two stys., 28 x 34, cement foundation, frame construction. Excavating done.

Two residences, cost $5,000, Mountview. Architect and general contractor, D. A. Cochlan, 12a Burns Block. Two storeys, 32 x 18, cement foundation, frame construction. Excavating done.

Three residences, cost $9,000, Regal Terrace. Architect and general contractor, M. McDonald, 1019 5th avenue west. Two storeys, 18 x 32, cement foundation, frame construction. Excavation done.

Three residences, cost $12,000, Royal, Sunalta and Mission. General contractors, The Consolidated Bldg. & Investment Co., 206 David Block. Two stys., 35 x 19, cement foundation, frame construction. Excavating done.

Hamilton, Ont.

Residence. Owner and general contractor, T. L. Kinrade, 10 Case street. 2 storeys, brick construction. Permit has been granted.

Residence, cost $2,500. Owner and general contractor, T. Stevenson, 22 Alexander street. 2½ storeys, brick construction. Permit granted.

Residence, cost $2,500, for I. S. Scheck, 269 Aberdeen ave. General contractor, W. M. Findlay, Fairmount ave. 2½ storeys, brick construction.

Residence, cost $3,500, for O. G. Peate, c/o Lees, Hobson & Stephens, Bank of Hamilton Bldg. General contractor, R. G. Wilson, Rutherford ave. Brick construction, electric lighting.

Montreal, Que.

Six flats, cost $11,000. Owner and general contractor, F. Rochon, 977 St. Hubert street.

Residence, cost $19,000. Owner and builder, A. Piche, 524 Casgrain. Three storeys, 85 x 70, stone foundation, brick construction. Foundations in.

Residence, cost $8,000, for Oscar Guibault, St. Genevieve, Que. Three storeys, 48 x 66, pressed brick construction, stone foundation. Excavating started.

Two residences, cost $6,000, Oxford ave. Owner and builder, Henry [illegible], 201 St. [illegible]. Two storeys, 41 x [illegible]

(Continued on page 67)

Tenders and For Sale Department

For Sale

[illegible] Stationary Engine, built by Old John Abell Engine Works, in first class condition. Can be seen running. Must sell. Are electrifying plant. The Canadian Rumely Company, Limited, [illegible] Abell Street, Toronto, Ont. 51

CITY OF REGINA

Tenders for

Steam Engine and Turbine Pump

Sealed tenders, addressed to the "City Commissioners," Regina, will be received until noon of **Thursday, January 29th, 1913**, for the supply and erection of a five million gallon turbine pump and compound condensing vertical engine.

The City reserves the right to reject any or all bids, and to waive any irregularities therein.

Accepted cheque for $500, made payable to the City Treasurer, must be deposited with each tender, which will be forfeited if the tenderer fails to execute the contract and bond when requested to do so.

Copy of specifications and conditions and other particulars may be had from the undersigned.

The deposits of the unsuccessful tenderers will be returned when the contract is signed.

R. O. WYNNE-ROBERTS,
Consulting Engineer.

Sealed tenders addressed to the undersigned, and endorsed "Tender for Extension to wharf at Providence Bay, Ont.," will be received at this office until 4 p.m. on **Tuesday, January 7, 1913**, for the construction of an Extension to the wharf at Providence Bay, Manitoulin Island, Algoma District, Ont.

Plans, specifications and form of contract can be seen and forms of tender obtained at this Department and at the offices of J. G. Sing, Esq., District Engineer, Confederation Life Building, Toronto, Ont.; H. J. Lamb, Esq., District Engineer, Windsor, Ont., and on application to the Postmaster at Providence Bay, Ont.

Persons tendering are notified that tenders will not he considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must he given

Each tender must be accompanied by an accepted cheque on a chartered hank, payahle to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 10, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—31524 51-52

Tenders Wanted

Tenders will be received by the undersigned for the building of a Sea-Wall and raising the road on the shore of Missisquoi Bay for a distance of twelve hundred feet. Specifications can be seen at the office of the Secretary-Treasurer.

The lowest or any tender not necessarily accepted.

Successful tenderers must give satisfactory security for the performance of the contract.

A. H. BORDEN, Sec.-Treas.,
51 Philipsburg, P.Q.

TENDERS

Sealed tenders will be received by the undersigned on or before **January 11th, 1913**, for the erection of a stone church in Homer, Ontario, Stone and sand supplied. Tenders may be for all or separate trades.

The lowest or any tender not necessarily accepted.

For plans, specifications, etc., apply to

NORMAN CUDNEY,
50-51 Homer, Ont.

City of Edmonton

Engineering Department

Invitation to Tender

Sealed tenders, registered and clearly marked on the outside of the envelope, "Tenders for Trunk Sewer Extension," and addressed to the City Commissioners, Edmonton, Alberta, Canada, will be received up to 6 p.m., **January 18th, 1913**, for the construction in tunnel of: –

Contract No. 3.
4050 lin. ft. 8-ft. dia. sewer.
2200 lin. ft. 6-ft. 6-in. dia. sewer.
1950 lin. ft. 4-ft. dia. sewer,
and accessories.

Contract No. 4.
6300 lin. ft. 4-ft. dia. sewer, and accessories.

Contract No. 5.
1200 lin. ft. 6-ft. dia. sewer.
4650 lin. ft. 5-ft. dia. sewer.
1620 lin. ft. 4-ft. 6-in. dia. sewer,
and accessories.

Contract No. 6.
1400 lin. ft. 6-ft. dia. sewer.
2050 lin. ft. 5-ft. dia. sewer.
3750 lin. ft. 4-ft. 6-in. dia. sewer.
3400 lin. ft. 4-ft. dia. sewer,
and accessories.

Contract No. 7.
4050 lin. ft. 4-ft. dia. sewer.
3500 lin. ft. 5-ft. dia. sewer,
and accessories.

Contract No. 8.
4700 lin. ft. 6-ft. dia. sewer.
4700 lin. ft. 5-ft. dia. sewer.
2450 lin. ft. 4-ft. dia. sewer,
and accessories.

Each tender must be accompanied by an accepted cheque, payable at par Edmonton, drawn in favor of the City of Edmonton to the amount of one (1 p.c.) per cent., of the tender submitted, as a guarantee that, should the work he awarded, the bidder is able and willing to enter into and carry out the contract.

Each bidder may tender on one or more or all of the contracts.

The lowest or any tender not necessarily accepted.

Plans and specifications may be seen at the offices of the City Engineer, Edmonton, Alberta, Contract Record & Engineering Review, Toronto, Canadian Engineer, Toronto; Engineering Record, New York, or a complete set of plans and specifications for any contract will be sent on a deposit of Twenty-five ($25.00) Dollars, and a set covering all the contracts on a deposit of One hundred ($100.00) Dollars. This deposit will be returned if plans and specifications are returned within fourteen (14) days of closing of tender.

51-1 CITY COMMISSIONERS.

Sealed tenders addressed to the undersigned, and endorsed "Tender for Public Building, Aylmer, Ont.," will be received at this office until 4 p.m. on **Monday, December 30, 1912**, for the construction of a Public Building at the place mentioned.

Plans, specification and form of contract can be seen and forms of tender obtained at the Post Office, London, Ont., at the Post Office, Aylmer, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence, In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an acsepted cheque on a chartered bank payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will he forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 3, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—29750. 50-51-19

Sealed tenders, addressed to the undersigned, and endorsed "Tender for Hamilton Harbor Improvements," will be received at this office until 4 p.m. on **Monday, December 30, 1912**, for the construction of a Wharf or Retaining Wall at the City of Hamilton, County of Wentworth, Ont.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the offices of J. G. Sing. Esq., District Engineer, Confederation Life Bldg., Toronto, Ont., H. J. Lamb, Esq., District Engineer, Windsor, Ont., and on application to the Postmaster at Hamilton, Ont.

Persons tendering are notified that tenders will not he considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender much be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,,
Ottawa, December 3, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—28636. 50-51-20

Sealed tenders addressed to the undersigned, and endorsed "Tender for Construction of Six Steel Hopper Scows, 300 yards capacity each," will be received at this office until 4 p.m., on **Tuesday, January 7, 1913**, for the construction of Six 300 cubic yards capacity Steel Hopper Scows.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the offices of T. H. Schwitzer, Esq., Mech. Superintendent, Birks Building, Ottawa, Ont.; J. G. Sing, Esq., District Engineer, Confederation Life Building, Toronto, Ont.; C. E. W. Dodwell, Esq., District Engineer, Halifax, N.S., and H. H. Donnelly, Esq., Supt. of Dredges, St. John, N.B.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 13, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. —32189. 51 52

Special Notice to Contractors

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. 11-t.f.

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

Situations Vacant

Missionary Wanted

A gentleman knowing well the principal Architects and Contractors in Montreal, Quebec, etc., to represent manufacturers of porcelain plumbing fixtures of high grade, newest designs, and competitive prices, on commission and expenses basis. Substantial additional income assured. Address in first instance, Box 661, Contract Record, Toronto, Ont. 50-51-21

Saleman Wanted

Engineer salesman wanted by large manufacturing firm in Eastern Ontario. One with hoist and rock drill experience preferred. All applications treated strictly confidential. Apply, giving full particulars regarding experience and qualifications, to Box 667, Contract Record, Toronto, Ont.

Residences

(Continued from page 145)

stone foundation, stone and bricdk construction. Foundations in.

Residence, cost $6,600. Owner and builder, Albert Levesque, 839 Dorion. 3 storeys, 50 x 40, stone foundation, brick construction, felt and gravel roofing.

Residence, cost $3,500, Orchard. Owner and builder, Zenon Legault, 218 Duquesne. Three storeys, 25 x 30, brick, cement foundation. Excavating started.

Residence, cost $5,000. Owner and builder, Henri Hogue, 2817 Park ave. 3 storeys, 40 x 42, cement foundation, brick veneer construction. Excavation done.

Alterations to residence, cost $3,000. Owner and builder, Zenon Lefebore, 180 Jacques Hertel. One storey, 27 x 30, brick, cement foundation. Foundations in.

Residence, cost $4,800. Owner and builder, V. E. Lambert, 1475 St. Andre. Two storeys, 48 x 45, brick veneer construction, stone foundation. Excavating done.

Residence, cost $5,000, for Ephraim Lapierre, 3613 St. Hubert. Builder, Oscar Latreille, 3597 St. Hubert. Three stys., 25 x 50, stone construction, cement foundation.

Residence, cost $6,000. Owner and builder, Oscar Latreille, 3597 St. Hubert. Three storeys, 50 x 50, cement foundation, stone construction. Excavation started.

Alterations to residence, cost $3,000, St. Valier, for Rev. McManus, 916 St. Valier. Builder, Jos. Landry, c/o owner. One storey, 21 x 30, brick veneer construction.

Residence, cost $5,000, Boyer. Owner and builder, H. Trottier, 1853 DeLaroche. Two storeys, 25 x 40, pressed brick construction, cement foundation. Excavating done.

Residence, cost $3,500, Labelle. Owner and builder, Victor Pelletier, 2684 Labelle. Two storeys, 25 x 40, stone foundation, brick veneer construction. Excavating started.

Residence, cost $6,000, St. Dominique. Owner and builder, Nap. Belanger, 628 Alma. Three storeys, 42 x 45, pressed brick construction, cement foundation. Excavating started.

Residence, cost $4,800, for Alphonse Deschene, 65 Dufresne. General contractor, Phillippe Jauvin, 112 Nicolet. 3 storeys, 25 x 45, stone foundation, pressed brick construction.

Residence, cost $4,200, for Madame C. Drapeau, 121 Addington ave. Builder, Wm. Dalpe. Two storeys, 25 x 40, cement foundation, pressed brick construction. Excavating started.

Ottawa, Ont.

Two double tenements, cost $9,000, for David Potter, "Prince Albert," Eastview. Builder, R. A. Kemp, 149 First ave. 33 x 40, stone foundation, brick veneer construction.

Residence, cost $9,000, Laurier avenue, for Lt.-Col. Fiset, Wilbrod street. Architect, Jas. Mather, 110 Wellington St. General contractor, Chas. Holbrook, 480 McLaren street. Three storeys, 33 x 62, stone foundation, solid brick construction.

St. Catharines, Ont.

Residence, cost $3,000, for Alex. Welch, 48 Maple street. General contractor, W. Harrop, 17 Haynes street. Two storeys, 40 x 50, cement block construction, cement foundation.

St. John, N.B.

Residence, cost $8,392, Partridge Island, for Dominion Government, Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. General contractor, I. E. Kane, Lowell, W.E. St. John. Brick construction.

Residence, cost $5,950, Partridge Island, for Dominion Government, Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. General contractor, W. T. King, 15 Dufferin Row, W. E. St. John. Residence for Doctor. Concrete foundation, frame construction.

Houses for boatman and caretaker, cost $8,450, Partridge Island, for Dominion Government, Dept. of Public Works, Secretary, R. C. Desrochers, Ottawa. General contractor, John Adams, 128 Queen street, W. E. St John. Concrete foundation, frame construction.

Toronto, Ont.

One pair residences, cost $5,000, 58-60 Bertmount ave. Owner and builder, Jno. Strain, 396 Pape ave. Two storeys and attic, brick construction, stone foundation.

Addition to residence of Sir William Mulock, 518 Jarvis street. Architect, Jno. M. Lyle, 21 Leader Lane. Builder, A. Weller, 52 Tecumseth street. Brick construction.

Residence, cost $3,500. Owner and builder, G. W. McLauchlin, 54 Hogarth ave. Architect, P. H. Finney, 79 Adelaide street east. Cement foundation, brick construction.

Residence, cost $4,500, Playter Cres. & Hurndale ave., for W. Webb, Playter Cres. Builder, W. Hague, 286 Lee ave. Two storeys and attic, 25 x 33, brick construction and foundation.

Residence, cost $12,000, 220 Russell Hill Road, for Jos. Thomson, 15 Victoria street. Masons, Skipper Bros., 99 Curzon street. 2½ storeys, brick and cut stone construction, brick foundation.

Winnipeg, Man.

Three residences, cost $15,000, Home street. Architect and general contractors, Rishton Construction Co., 637 Home street. Two storeys, 22 x 28, stone foundation, frame construction. Foundations in.

Two dwellings, cost $5,200, Lipton St.

Owners and general contractors. Barclay & Fraser, 116 Agnes street. Two storeys 25 x 27, stone foundation, frame construction.

Power Plants, Electricity and Telephones

Hamilton, Ont.

One storey addition to transformer station, cost $4,000. Mayor, Geo. H. Lees. Clerk, S. H. Kent. General contractor, S. Howard, 231 Mary street.

Peterboro, Ont.

Electric lighting system, cost $120,000, under contemplation of the city council. Clerk, S. R. Armstrong. Engineer, T. A. S. Hay. Ratepayers will vote on by-law January 7th.

Port Alberni, B.C.

Equipment for electric lighting plant. Engineer, W. Anderson, Vancouver Block, Vancouver. Contract for one Diesel oil engine let to Mather-Yuill & Co., 429 Pender street, Vancouver. Contract for one 100 kw. generator and switchboard let to the Canadian General Electric Co., 1065 Pender street west, Vancouver.

Port Colborne, Ont.

Hydro-electric sub-station planned for the Ontario Power Co., Niagara Falls. Superintendent, H. H. Wilson. One sty., 35 x 75, concrete foundation, steel and brick construction. Excavating started.

St. Catharines, Ont.

Extension to gas plant, cost $7,000, planned by City Council. Engineer in charge, Edward Visard. Ratepayers will be asked to vote on by-law January 1st.

Vancouver, B.C.

Telephone Exchange Buildings, cost $60,000. The B. C. Telephone Co., 555 Seymour street, will shortly have plans drawn for three sub-exchange buildings.

Yorkton, Sask.

Electric plant, cost $39,453. Secretary-treasurer, F. T. A. Acheson. Electrical engineer, M. M. Inglis. Contract for one 500 B. H. Diesel engine awarded to the Canadian Boving Co., 164 Bay street, Toronto, Ont. Alternator and exciter to Siemens Bros., 707 McArthur Building, Winnipeg, Man. Switchboard to Canadian Westinghouse Co., Portage ave., Winnipeg, Man.

Miscellaneous

Vancouver, B.C.

City Council has ordered city engineer to call for tenders for a municipal rock crusher. Clerk, Wm. McQueen.

Winnipeg, Man.

Copper wire, cost $10,225, 50,000 lbs. No. 2 B & S. General contractors, The Steel Co. of Canada, 703 Union Bank Bldg., at $20.45 per 100 lbs. Board of Control. Secretary, M. Peterson. Engineer, J. G. Glassco, 54 King street.

Machinery, cost $6,079. General contract to the A. R. Williams Machinery Co., 260 Princess st. Lathes, punches, shears and radial drill for new machine shop. Lathes $3,245, punch and shears $1,174, radial drill, $1,660.

Building Permits

Toronto, Ont.

George Bushlen, two-storey brick dwelling, near Keele, on Westminster avenue, $5,000.

Canadian Northern Railway, one-sty. steel and iron shed, near Cherry street on Eastern ave., $16,000.

J. A. Orr, three attached two-storey brick stores and dwellings, corner Dundas and Parkway, $8,000.

A. W. Clendenan, one pair semi-detached, two-storey and attic brick dwellings, on 243-245 Brunswick, $6,000.

H. E. Mackey, two pair two and one-half-storey brick dwellings, on 144-146-148-150 Essex avenue, $8,000.

G. E. Case, one pair semi-detached, two-storey brick dwellings, on Queen and Heward, $5,000.

L. C. Sheppard, eight detached, two-storey and attic brick dwellings, near Summerhill, on Edgewood crescent, $25,000.

Wm. Halls & Son, two-storey brick dwelling, near Howard Park, on east side Keele, $7,000.

Lake Simcoe Ice Supply Co., one-sty. brick coal pocket on 27-51 Florence St., $7,000.

Messrs. Morofsky & Kerzner, two detached brick dwellings, two storeys, Evelyn Crescent, $6,000.

George Treadway, 180 Queen street W. one pair two-storey brick veneer and roughcast dwellings and stable, Woodbine ave. Architect, T. Jones, $3,000.

F. Jewer, 589 Concord ave., two detached two-storey and attic brick dwellings, cor. Shaw and Manchester. Architect, Mr. G. Miller, $5,400.

J. M. Cowan, 65 Adelaide E. (in trust), three-storey brick warehouse. Stafford and Defoe streets. Builder, T. Essery, $14,000.

A. E. McTaggart, Dovercourt Road, two-storey and attic brick dwelling, Grenadier Road. Architects, Messrs. Redmond & Beggs, $3,500.

Robt. Gallagher, 246 Ossington Road, two-storey and attic brick dwelling, Hilton ave., $2,900.

The Canadian Pacific Railway Co., 3-sty. brick and steel freight offices, cor. Simcoe and Wellington streets. Architects, Messrs. Hutchison, Wood & Miller. Builders, the Canadian Stewart Co., $70,000.

The Lake Simcoe Ice Supply Co., brick coal pocket, Florence street. Architect, E. J. Banfield, $7,000.

Messrs. Wm. Halls & Son, 6 Park Pl., two-storey brick dwelling, Keele street, $7,000.

D. Heiman, 63 Elizabeth street, two-storey brick warehouse, Walnut ave. Architect, Mr. H. Pulman, $4,500.

Robt. Gallagher, 246 Ossington ave., two-storey and attic brick dwelling, Hilton ave., $2,900.

Business Notes

Berlin, Ont.

Tailor shop of S. O. Schmidt, 61 King street, burned, loss $3,500. Will require flooring, fixtures, machines, electric lighting equipment.

Bobcaygeon, Ont.

Power house owned by Municipal Council (Electric Light Commission), destroyed by fire. Reeve, A. E. Bottum. Will rebuild.

Hespeler, Ont.

Moulding shop of Canada Machinery Corporation, Sheffield street, burned. Loss $20,000, partly covered by insurance.

Sturgeon Falls, Ont.

Ontario Hotel, owned by M. Brisbois, burned, loss $10,000. Partly covered by insurance.

Watson, Sask.

Stores of Robinson & Jones, general store, Schinkler Bros., building supplies, completely destroyed by fire. Loss $12,500.

Yarmouth, N.S.

Queen's Hotel, owned by Robert Melvin, destroyed by fire.

Zurich, Ont.

Apple drying buildings of Jacob Meidinger burned. Loss $4,000. New buildings to be erected later. Cement or fireproof construction.

New Companies

The Pinehurst Land Company, Limited, has been incorporated with a capital stock of $35,000, to carry on business as a general land and building company, with head office at Montreal. The incorporators are J. W. Blair, C. A. Hale, advocates, and F. J. Laverty, K.C., all of Montreal.

Currie-Livock Limited has been incorporated with a capital of $40,000, to carry on a general land and building business, plumbers, steam fitters, sheet metal workers, engineering, etc., with head office at Ottawa. The provisional directors are Jas. Livock, W. J. Carson, merchants, and N. J. Gareau, bookkeeper, all of Ottawa, Ont.

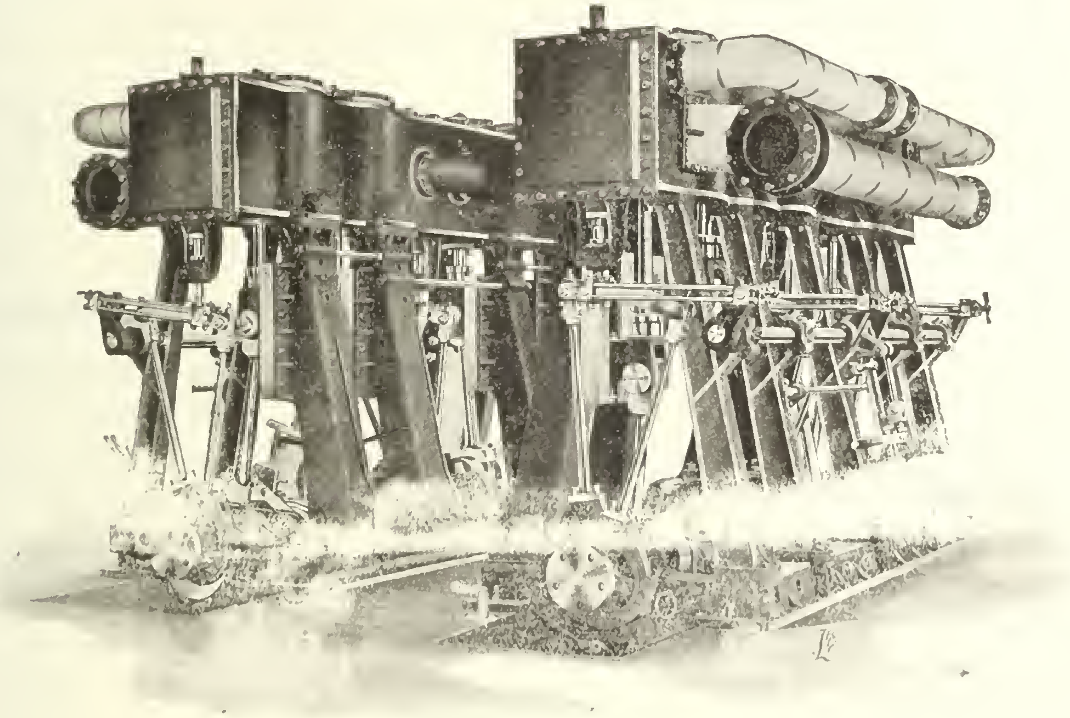
Canada West Real Estate Limited has been incorporated with a capital of $100,000, to carry on a general business as a land and building company, with head office at Chesley, Ont. The provisional directors are C. J. Mickle, barrister, E. B. Caldwell, accountant, and G. L. Phillips, stenographer, all of Chesley.

United Railway Supplies Limited, have been incorporated with a capital of $20,000, to carry on business as dealers in railway, municipal and contractors' supplies, with head office at Montreal. The incorporators are E. E. Howard, K.C., H. U. P. Aylmer, and J. Dewitt, advocates, all of Montreal.

Canada Stone Company, Limited, has been incorporated with a capital stock of $1,000,000, to manufacture and deal in stone and other structural material and carry on business as builders and contractors, with head office at Montreal. The incorporators are W. H. Fulton, J. B. Kenny, and D. C. Sinclair, barristers, all of Halifax, N.S.

The Engle Battery Company of Canada, Limited, has been incorporated with a capital stock of $100,000, to carry on business as electricians, mechanical engineers, manufacturers and dealers in electrical apparatus, etc., with head office at Quebec. The incorporators are L. B. St. Laurent, Hector La Ferte, advocates, and Antonin Galipeault, K.C., all of Quebec City.

ENGINES and BOILERS



Marine Engine built for the R. & O. Nav. Co.'s Steamer "Rapids Prince."

We make Boilers of every kind for any service. Engines, Pumping Machinery and heavy Plate work. "Inglis" indicates the best in Quality, Design and Workmanship.

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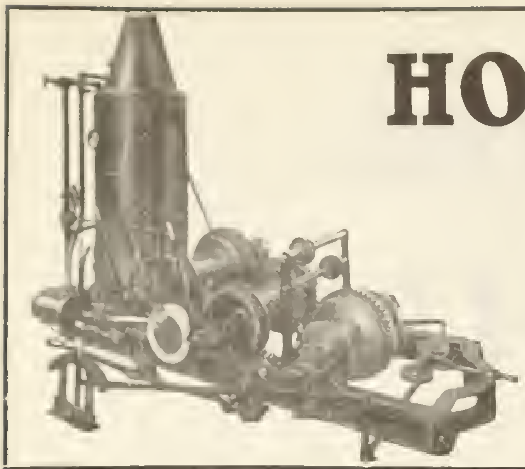

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Some of the strongest friends of the M. & H. Hoists are to be found among the men who have owned and used them. For instance the following written by one of the Lumber Kings of Canada—a man who telegraphed us an unsolicited order for another hoist not long ago.

"Answering your enquiry, I am pleased to state that the hoists with which you supplied me some years ago have given good satisfaction and have been in pretty constant use ever since.

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2—No. O Thew Steam Shovels Full Circle with $\frac{5}{8}$ yard dipper
1—Little Giant Steam Shovel 26 Ton Traction one yard bucket
1—No. 1 Full Circle Vulcan Traction Steam Shovel
1—Buckeye Trench Machine, cuts trench 24″x 7½′
1—Buckeye Trench Machine, cuts trench 27″x 10′
1—Buckeye Trench Machine, cuts trench 24″ & 30″ x 12′
1—Parson Trench Machine, cuts trench 28″ to 60″ x 20′
1—Municipal Trench Machine, cuts trench 24″ to 72″x24′
1—1½ yd. Owens Clam Shell Bucket
2—1½ yd. Page Drag Line Buckets
1—1 yd. Obenberger Drag Line Bucket
5—1½ yd. Clam Shell Buckets (Brown Hoisting Mach. Co.)
1—J. I. Case 10 ton Steam Road Roller
1—Nat. Elevating Grader with horse and engine hitch
1—36 Gauge 16 ton 9x16-4 wheel Saddle Tank Locomotive
1—45 ton Vulcan Track Shovel

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There is a Popular Demand For This Newest of New Gas Lighting Fixtures

The increased public interest in illumination has resulted in overturning many of the time-worn prejudices which have heretofore hampered the introduction of modern methods of illumination. The public are beginning to appreciate the fact that brilliant light sources really indicate, in most cases, extremely poor illumination, and more attention is being paid to the diffusion of light from large sources of low brilliancy. The **"Semi-indirect"** system of illumination through fixtures as here illustrated is at once the ideal for residential use.

The system of lighting known as the **"Semi-indirect Method"** consists in reflecting the light that would **naturally** be thrown below, partly up to the ceiling, which is usually of light color, whence it is again reflected in a diffused form throughout the room. The ceiling thus becomes the visible source of light and may be compared to the sky when the sun is hidden by the clouds.

The object of this method is to prevent the glare and dazzling effect which result from the ordinary use of lights; it produces the same soft, diffused light that is characteristic of good daylight.

These fixtures consist of beautiful leaded art glass bowls, supported by brass chains. They come in varied widths and lengths, to suit conditions, and the prices are very low in comparison to regular lines of general lighting fixtures. We have them for all purposes, whether in hall, library, sitting room, or dining room. It is worth your while to see these. Our representatives will give you all necessary data and information.

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THOSE engaged in the design and erection of buildings, however large or small the structures may be, are rapidly realizing that absolute fireproofing is an impossibility if they leave a perpetual invitation for an incipient fire to travel from its point of origin, from room to room, from floor to floor. This is by no means a technicality hard to express or understand. However great the precautions or expenditures, they are of but slight avail so long as it is possible for a fire to eat its way into other portions of a building.

The Dahlstrom Products in an otherwise fireproof structure simply mean the absolute elimination of all combustible interior trim. Fires may occur, but they starve themselves to death. This is inevitable. The Dahlstrom patented cold drawn hollow steel doors and trim are an impenetrable fire barrier.

While the quantity of evidence substantiating these statements that no building can be fireproof when equipped with inflammable trim is overwhelming, it is hard for some to stretch their imagination to the extent of believing that the installation of the Dahlstrom Products increases rather than diminishes the interior artistic possibilities. Even our interpretation and duplication of any known wood is more artistic than the wood itself. Aside from this, any conceivable color scheme or combination may be carried out, and on more permanent lines than is possible otherwise. It should be remembered, also, that a Dahlstrom finish is virtually a part of the metal itself. Each coat of paint is "baked on" in heated ovens. The finish is as permanent as it is artistic. No "word picture" is capable of conveying a true idea of a Dahlstrom finish. You must see an installation or samples which we shall be glad to furnish.

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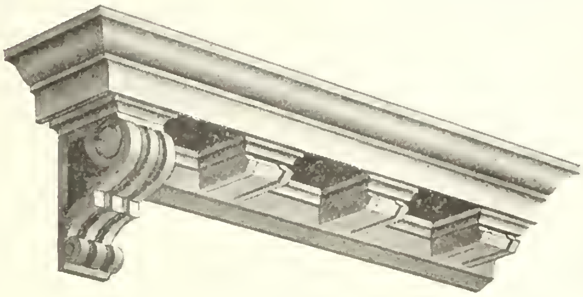

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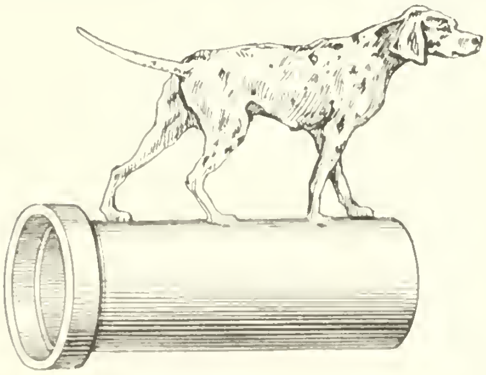

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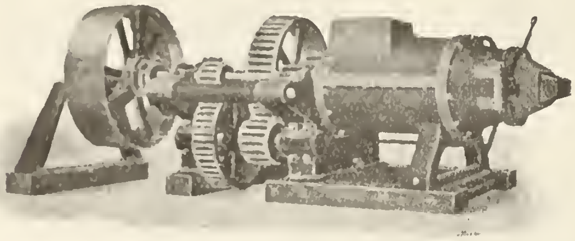

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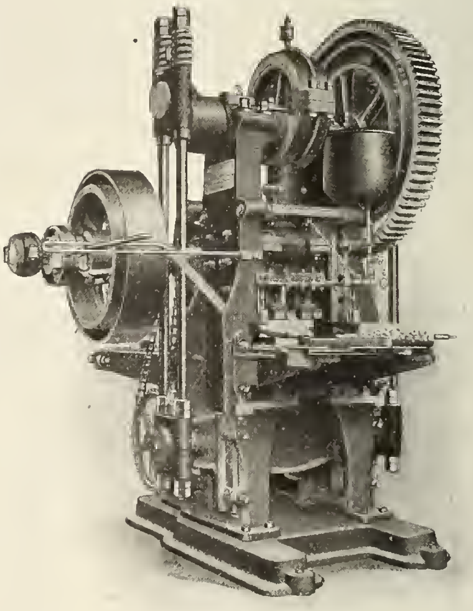

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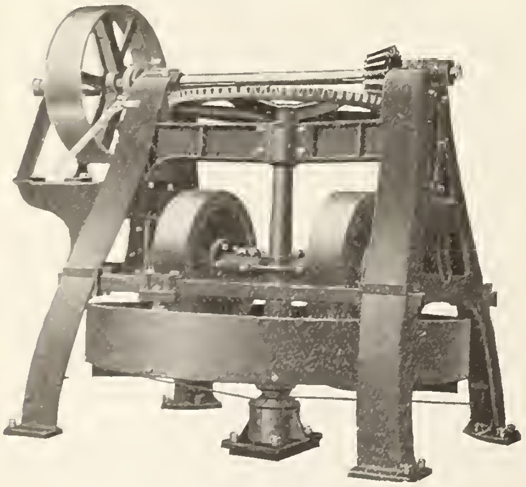

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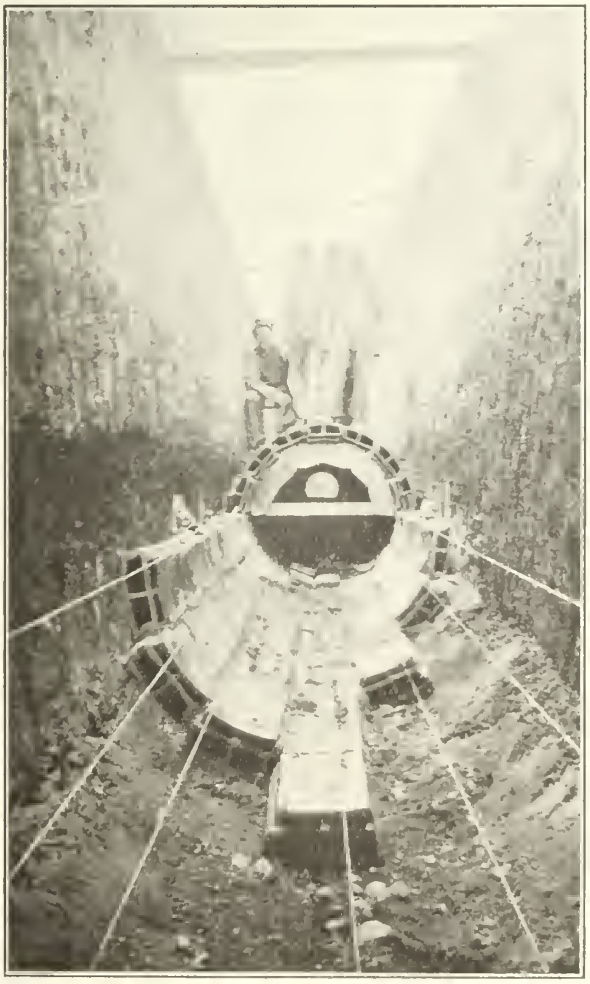
Made for sewers from 30 to 108 inches in diameter



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RESULTS: Permanent efficient sewers, more easily and cheaply constructed than expected. Owing to the smooth glazed surface, exceeds the capacity anticipated; everybody satisfied, no complaints.

ADVANTAGES:—No danger of disintegration, provides for underdrainage, can be laid to better advantage in cold weather than other material, sometimes saves in width of excavation (see cut), is not expensive, etc.

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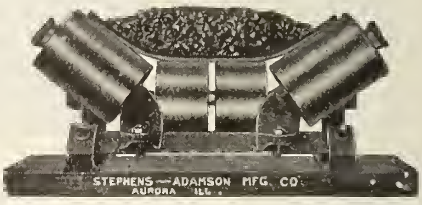

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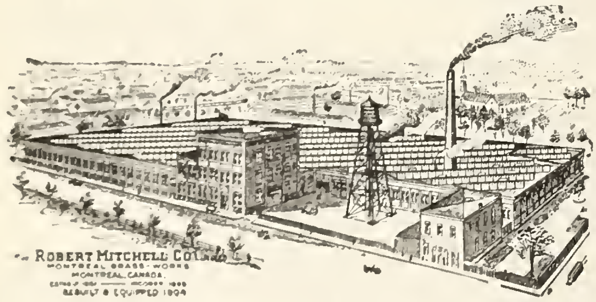

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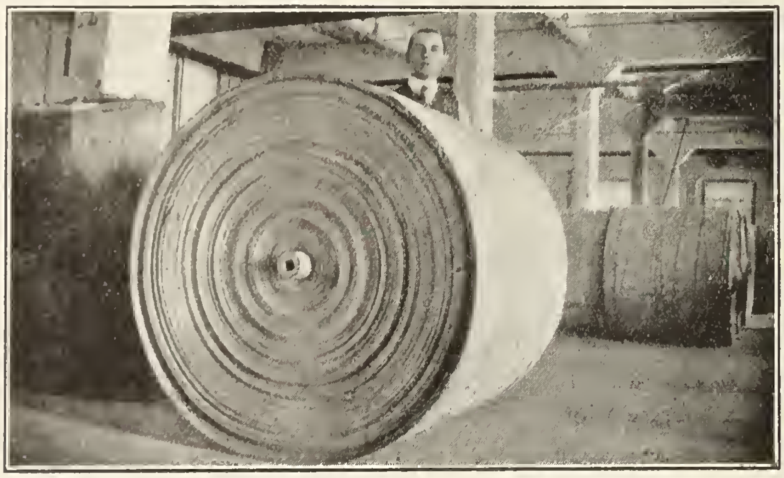

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because it is built to stand constant strain. The two miles of conveyor belting installed in the G. T. P. elevator at Tiffin, Ont., has handled as high as 527,000 bushels of grain per day.

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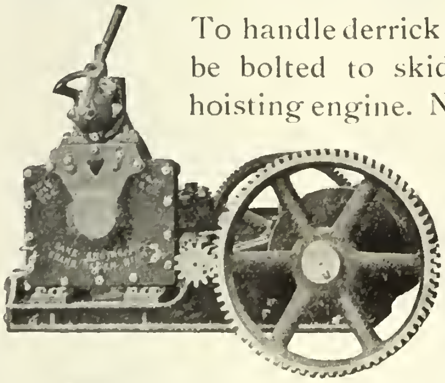

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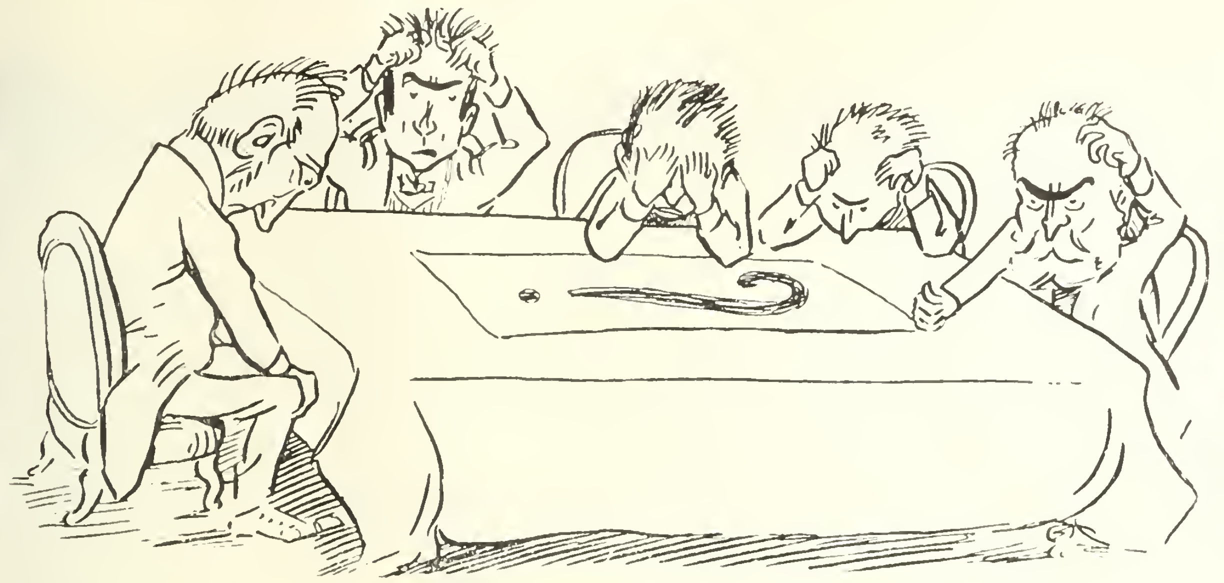

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We make the best, we know it, our customers know it. They found out by trying our products. Why don't you? We could talk all day about quality—everybody does—but our goods speak for themselves.

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Sewer Pipe Plant
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Head Office:—SWANSEA, ONT.

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Waterdown Station
ALDERSHOT, P.O.

MIMICO SEWER PIPE

LOOKS BEST SOUNDS BEST IS BEST

VITRIFIED

The Pipe
That's Round

And on
the Square

SALT-GLAZED

PRICES FOR 1913 CONTRACTS ON APPLICATION.

300 CAR-LOADS CARRIED IN STOCK IN ALL SIZES 4″ to 24″.

We Wish Our Many Friends
A Very Merry Christmas and
Prosperous New Year.

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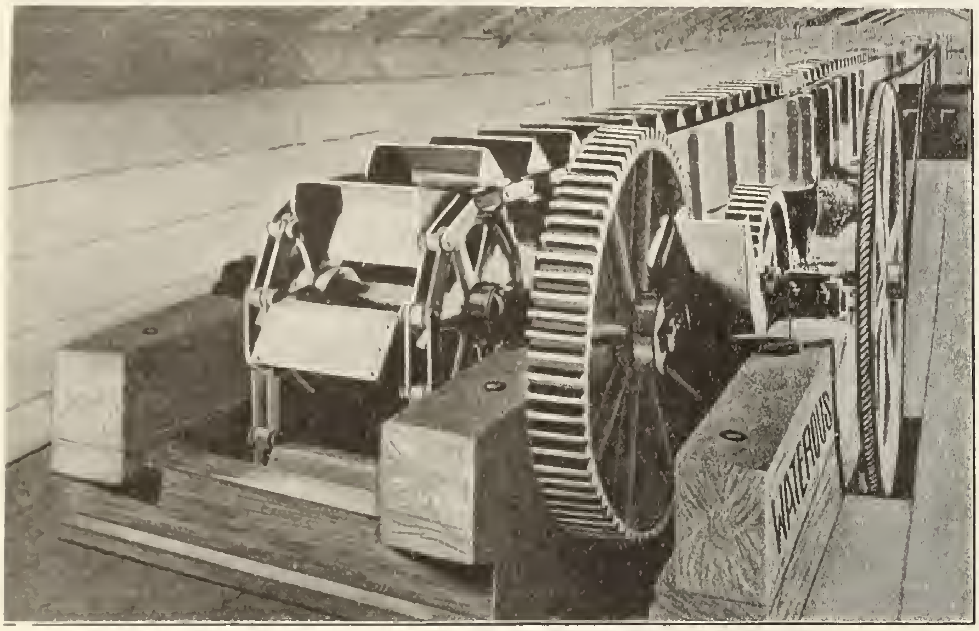
Steel Conveyors and Elevators



We build a complete line of **Chain Ore Conveyors and Elevators** for handling sand, stone, ores, cement, coal, gravel, etc.

Buckets of superior quality and of approved pattern and weight. Seamless and strong they afford clean delivery of material. In all sizes, punched for flat belt or chain.

Chains of special type or standard designs are furnished as desired.

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is the best

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for spigot and faucet pipes for Gas and Water Mains.

Joints can be made in water without difficulty.

"Lead Wool"

joints are caulked cold, no melting whatever required.

One ton of "Lead Wool" will make as many joints as two tons of pig lead.

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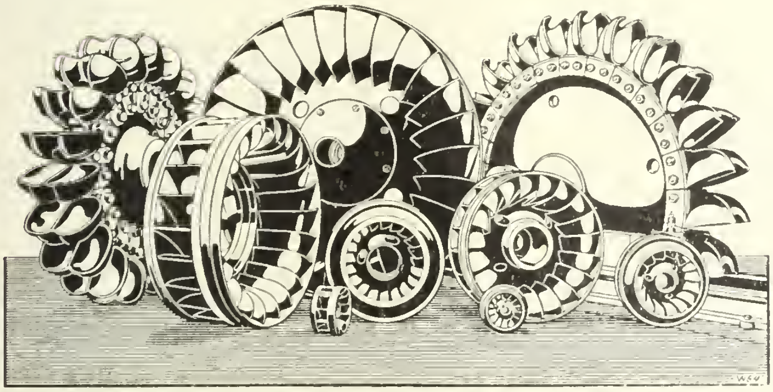

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Are you bringing in your clay with the least cost? If not, why not? By using the hoist illustrated below you can reduce expenses to a minimum.

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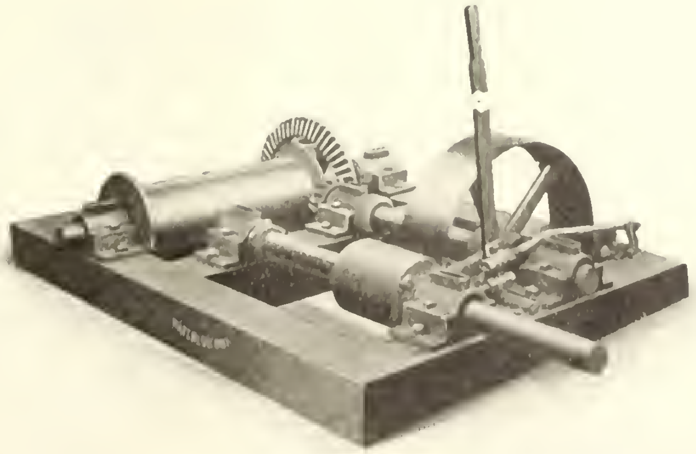

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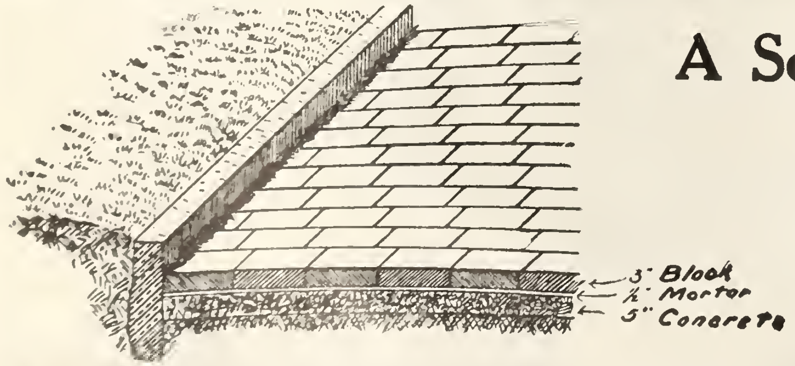

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For Concrete and Macadam

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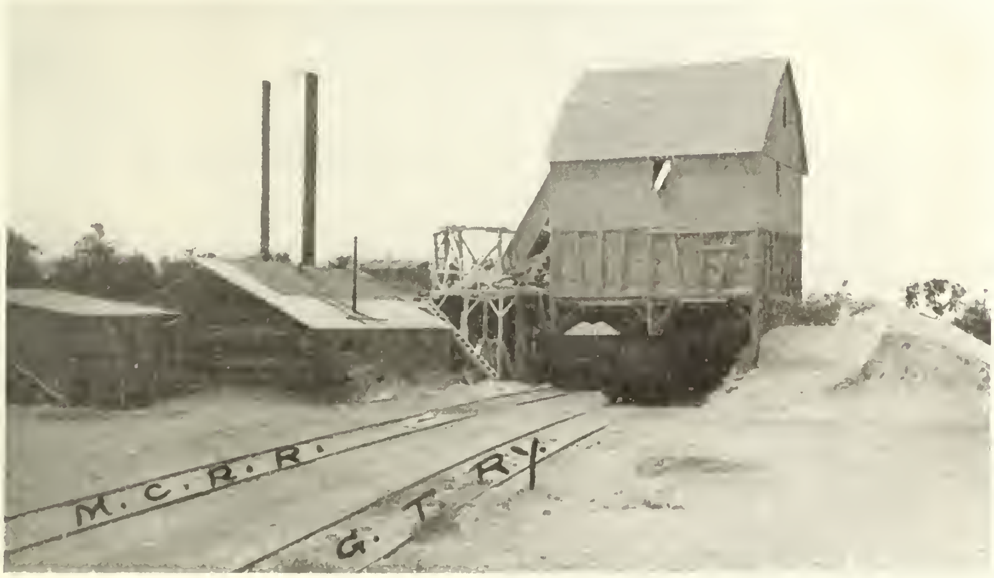

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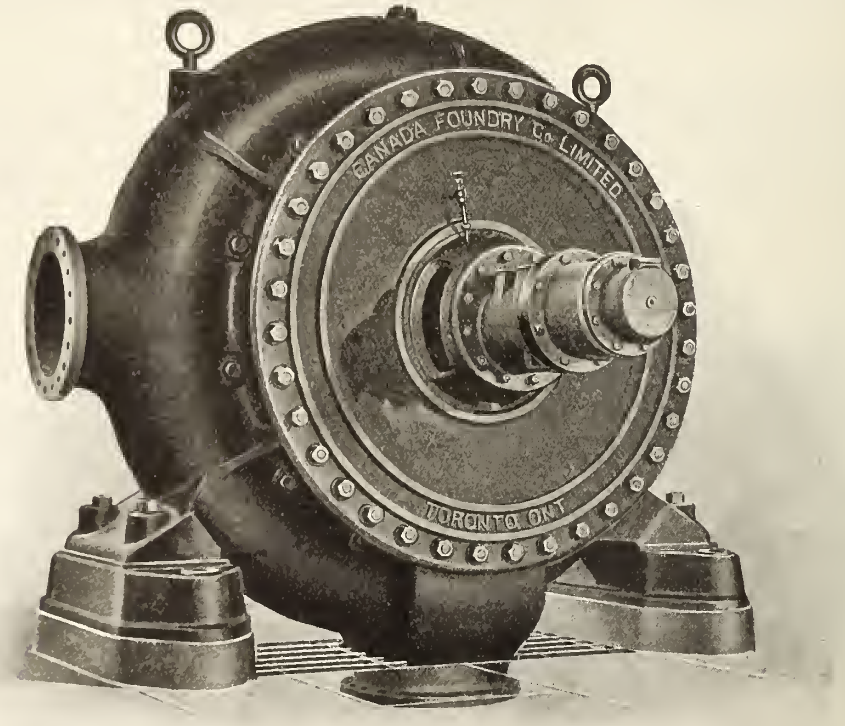

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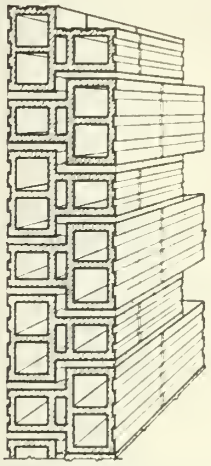
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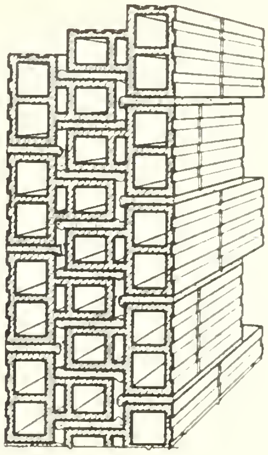
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Their plants total a value of **$2,600,000.00**, and the tile is only a couple of years old

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Plain Rounds

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Cross Arm Braces, Plain and Galvanized.

We can ship from stock

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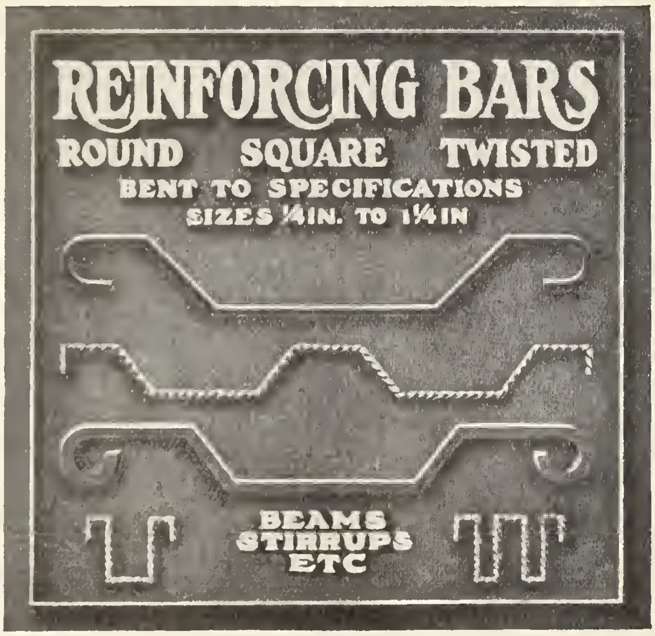

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30 " " "
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that will
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service in
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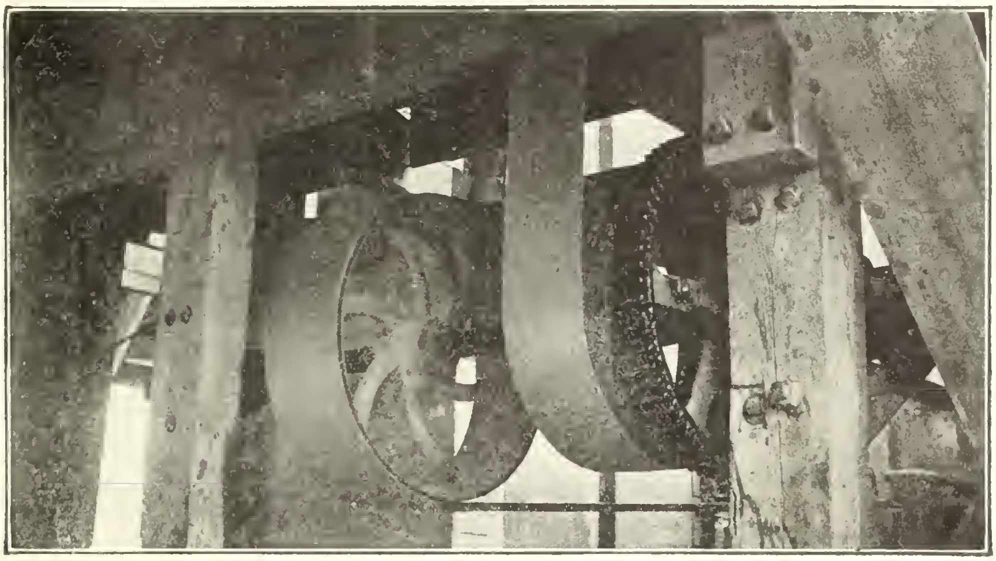

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This is the original solid woven belt.

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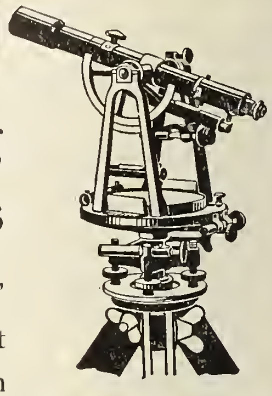

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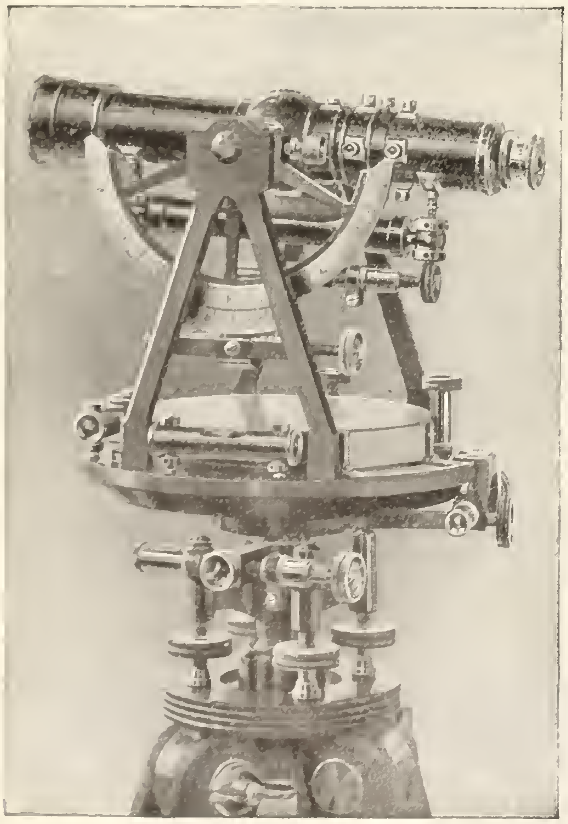

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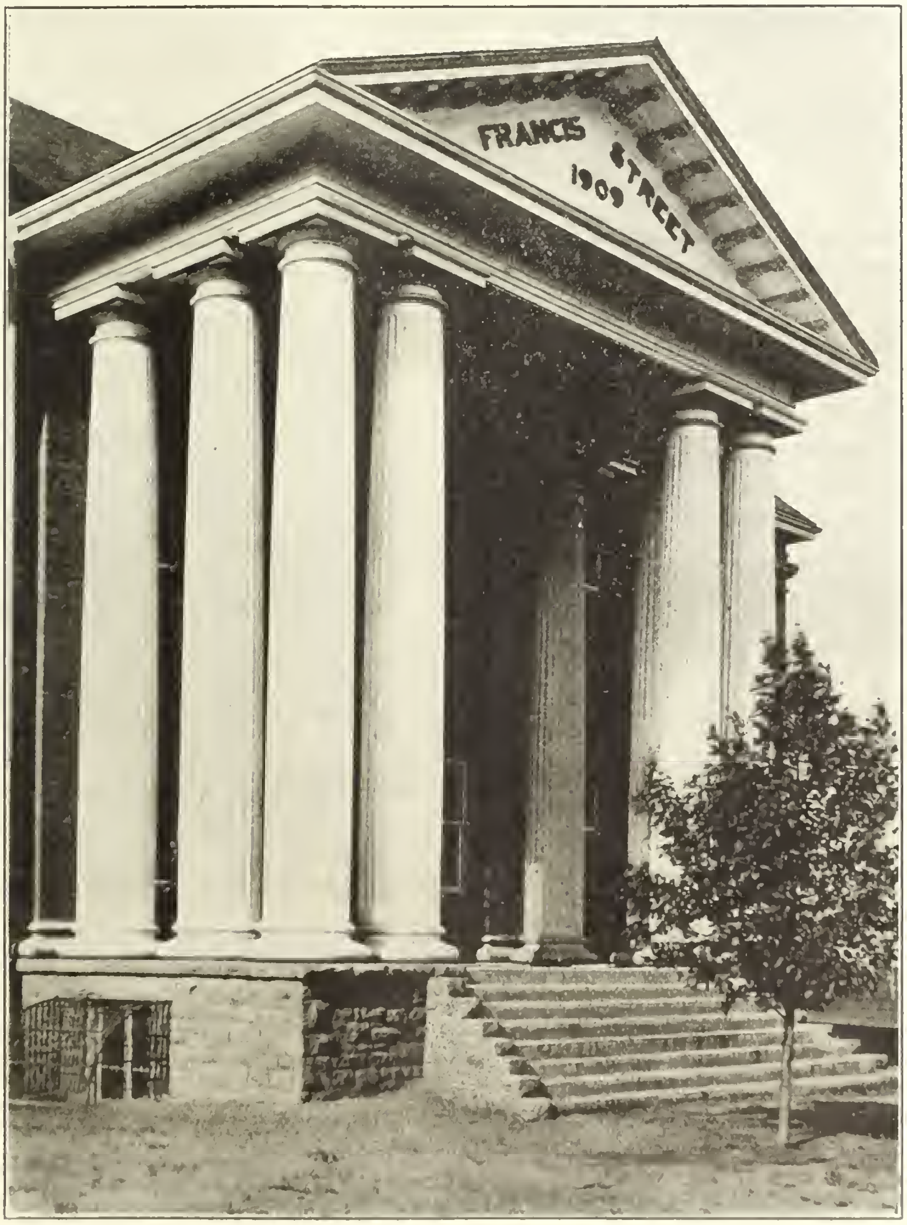

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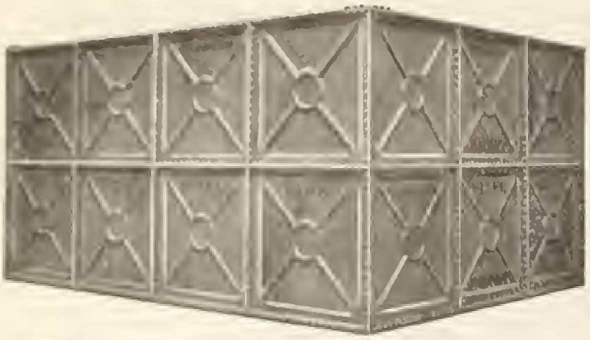

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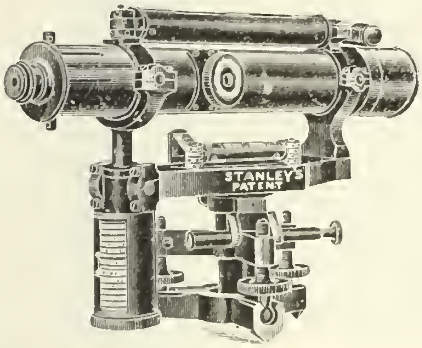

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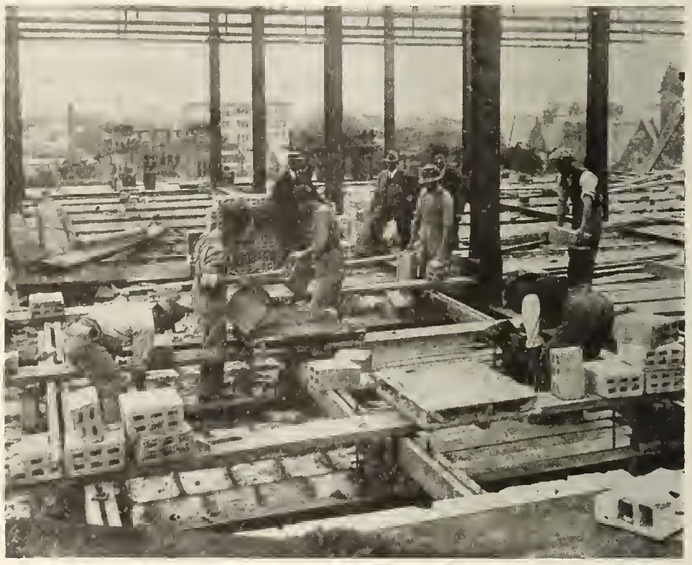

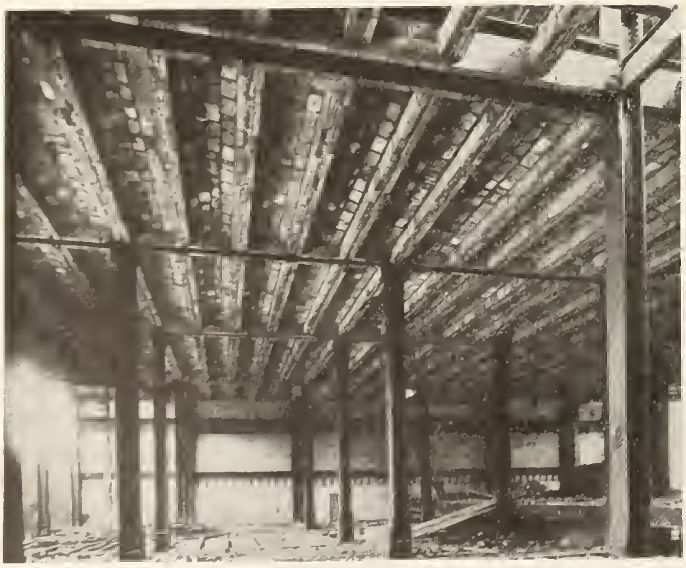

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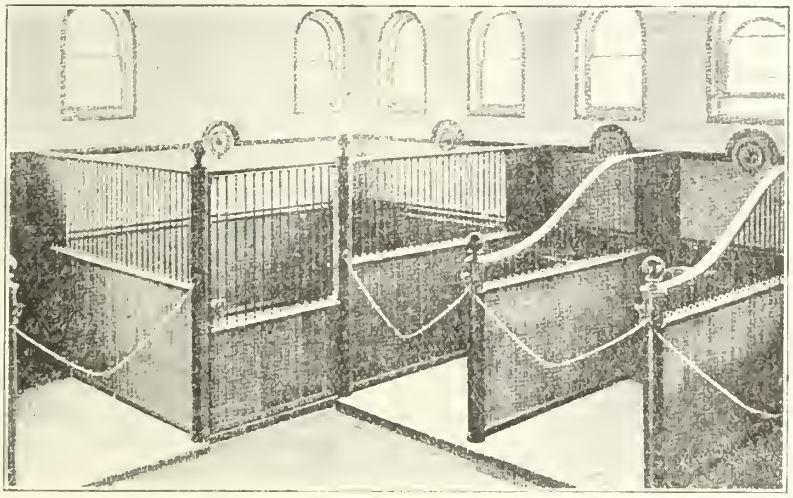

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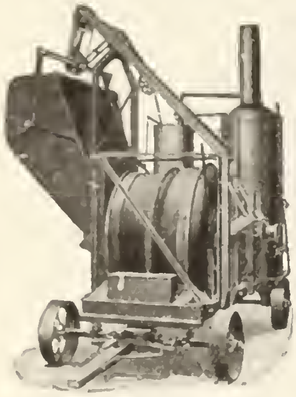

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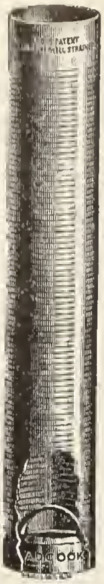

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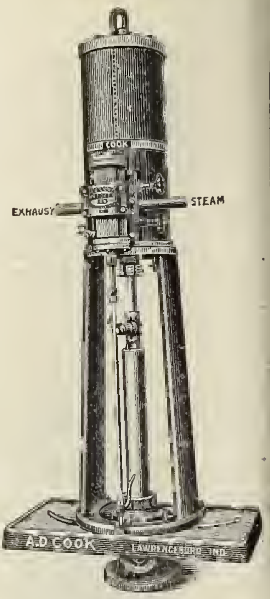

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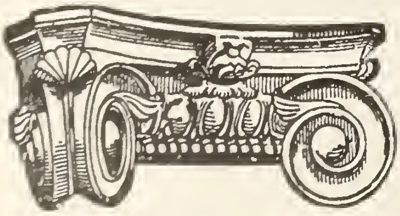

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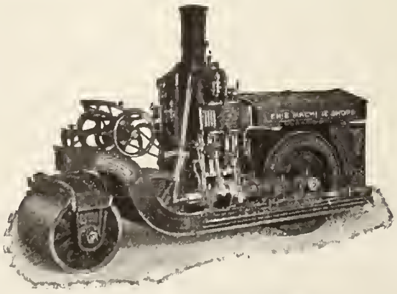

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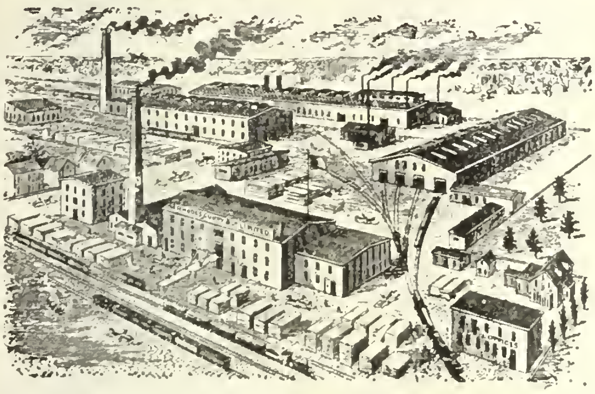

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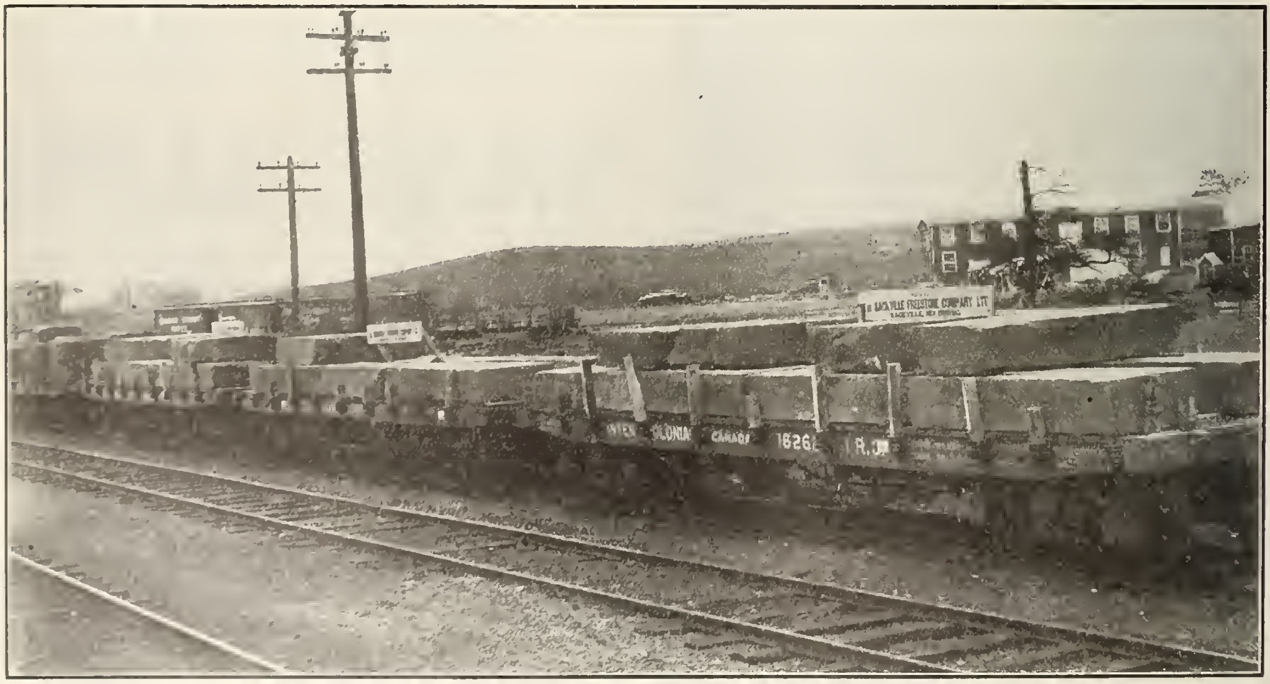

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Practical House Framing, by Albert Fair. Published in 1909 by Industrial Book Company, New York. 108 pages, illustrated. Price 50c.

Hints for Carpenters, by Albert Fair. Published in 1909 by the Industrial Book Company, New York. 144 pages, illustrated. Price 50c.

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The Building Mechanics' Ready Reference—Stone and Brick Masons' Edition, by H. G. Richey. Published in 1907 by John Wiley & Sons, New York. 266 pages, illustrated. Price 50c.

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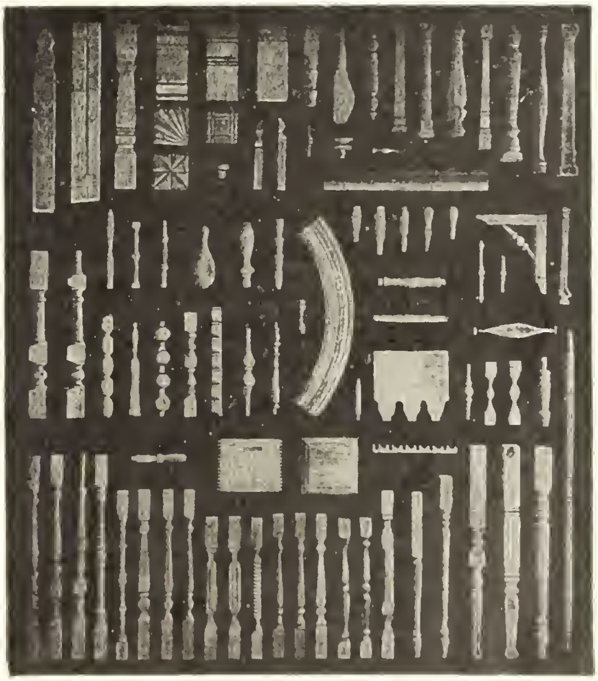

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The following are wholesale prices delivered at Toronto:—

	Per M
No. 1 dry pressed red brick	$18 00
No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	11 00
Wire cut bricks for foundation work	12 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

LUMBER (Building Material)

Hemlock Lumber—

2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00

Pine—

1 in. common pine 8 to 12 in wide rough	27 00	30 00
2 in. white pine Bill stock	29 00	33 00
⅞ x 8 and 10 in. pine shelving..	36 00	40 00
⅞ x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	

Pine trim for paint finish—

4 in. casing per 100 ft.	2 00
5 in. casing per 100 ft.	2 25
8 in. pine base, per 100 ft.	3 25
10 in. pine base, per 100 ft.	4 25
4 in. pine window stool	2 75

Shingles—

XXX B. C. Clear Shingles, per M.	3 60
N. B. Extras	3 50
N. B. Clears	2 90
No. 1 pine lath, per M.	4 75
No. 2 pine lath	4 25
No. 1 spruce lath	4 00

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5 in. at small end, each	25
7 in. at small end, each	35
Hemlock lath	3 25

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	Star	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40	4.60	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "		15.00
91 to 95 "		17.50
96 to 100 "		20.50
101 to 105 "		24.00
106 to 110 "		27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

MONTREAL

	Star	D.D
25	$3.25	$4.75
40	3.45	5.20
50	3.85	6.00
60	4.10	6.50
70	4.35	7.00
80	4.85	7.50
85	5.30	8.25
90		9.75
95		10.75
100		12.50

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3rds Double
Up to 25 u.i.	3.50	5.00
26/40	3.75	5.50
41/50	4.25	6.25
51/60	4.75	7.00
61/70		8.00
71/80 .. .		9.00
81/85		10.00
86/90		11.00
91/95		13.00
96/100		16.00

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No. 4 compression bath cock	net $1.85
No. 4½ Fuller's	net $2.50

Square head brass cocks, 60 per cent.

Lead Pipe

Lead pipe, $7.50 net; lead waste, $9.00 net; caulking lead, 7½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$2.04	¼ inch	$2.86
⅜ "	2.04	⅜ "	2.86
½ "	2.72	½ "	3.57
¾ "	3.16	¾ "	4.31
1 "	4.54	1 "	6.19
1¼ "	6.19	1¼ "	8.44
1½ "	7.43	1½ "	10.13
2 "	9.90	2 "	13.50
2½ "	15.80	2½ "	21.56
3 "	20.75	3 "	28.31

Malleable fittings—Canadian discount, 40 and 42½ per cent.

Cast iron fittings, 60-10; headers, 65; flanged unions, 70; malleable bushings, 67½; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 and 10 per cent.

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6-in.	40c ft.	18-in.	1.90 ft.
9-in.	65c ft.	20-in.	2.25 ft.
12-in. .. .	1.00 ft.	24-in.	3.25 ft.

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Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

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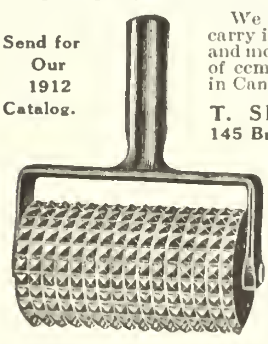

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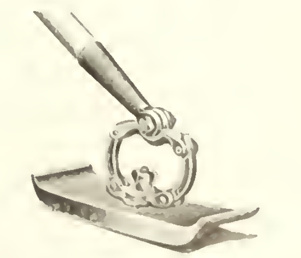

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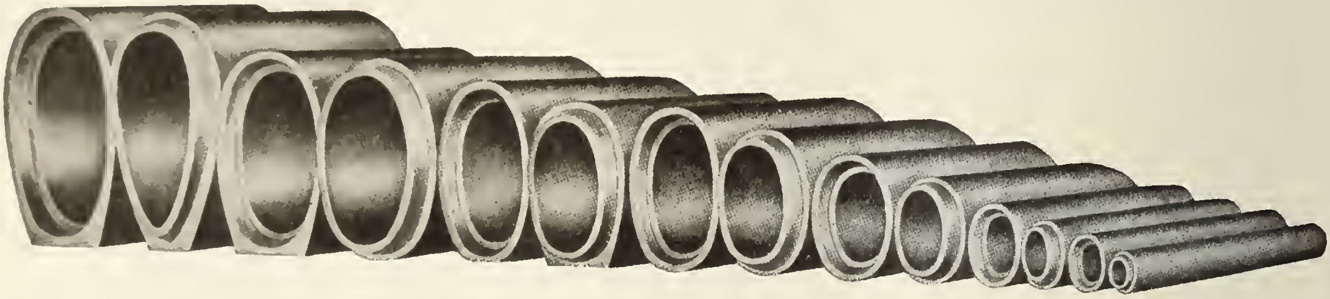

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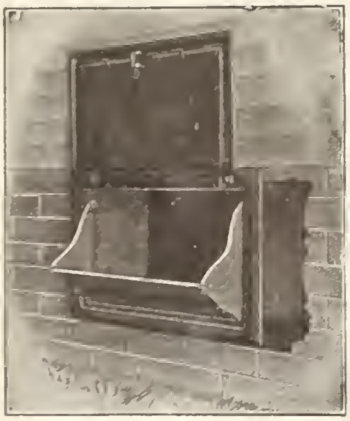

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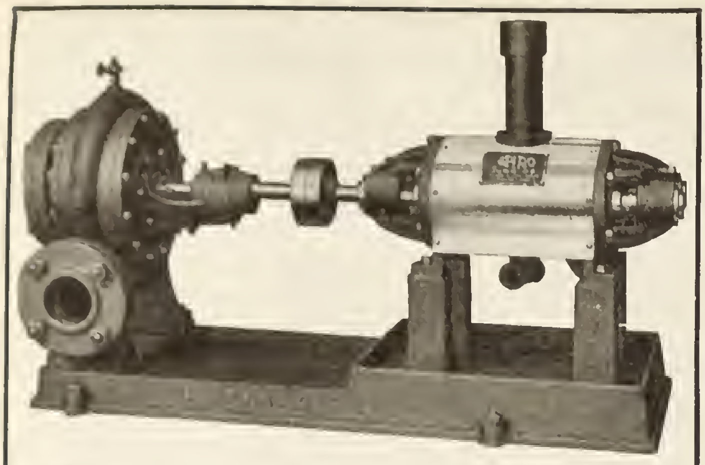

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No one dreamed that a pair of plain herring-bone gears could be made into an engine or turbine before the advent of the Spiro. This new principle is revolutionary and has reduced prime mover construction to what would seem the limit of simplicity, service and economy combined. Not a single blade, nozzle or valve in the entire unit. Just a pair of herring-bone gears enclosed in a cylinder, with a jet of steam blown against them.

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The First Gas Producer Brick Kiln in Canada

About this New Plant

¶ The bricks in our new plant are burned by four continuous gas producers, which insure absolute uniformity of burning, of color and of hardness.

¶ A large side wire cutting machine is used for cutting the bricks.

¶ The dryer is a ten tunnel Metallic Radiation dryer with a capacity of 100,000 bricks a day.

¶ The motive power and lighting is electricity—the first plant in Canada with electricity throughout.

¶ Our present output is 600,000 bricks a week.

¶ We have railway connections with the C. N. R.

¶ The plant is located in the Don Valley opposite St. Clair Ave.

We Make

Shale Brick
Red Stock Brick
Grey Stock Brick

Side
Wire
Cut

The Sun Shale Deposit

¶ The clay deposit consists of 135 acres of various clays and shales suitable for making red and buff brick. We also have an abundant supply of red and grey sand for building purposes.

¶ Our shales and clays have all the properties essential to the manufacture of high grade brick.

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Brickyard Equipment

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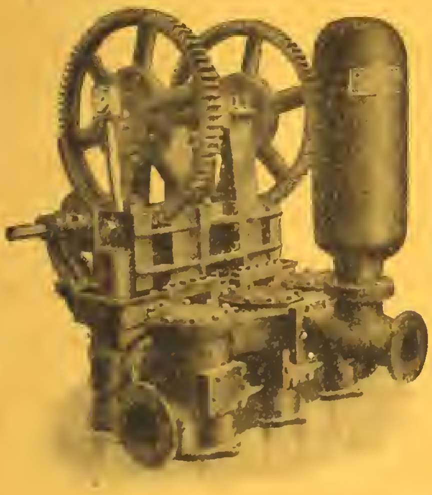
Vol. 26 Toronto, December 25, 1912 No. 52

ESTABLISHED 1886

Contract Record and Engineering Review



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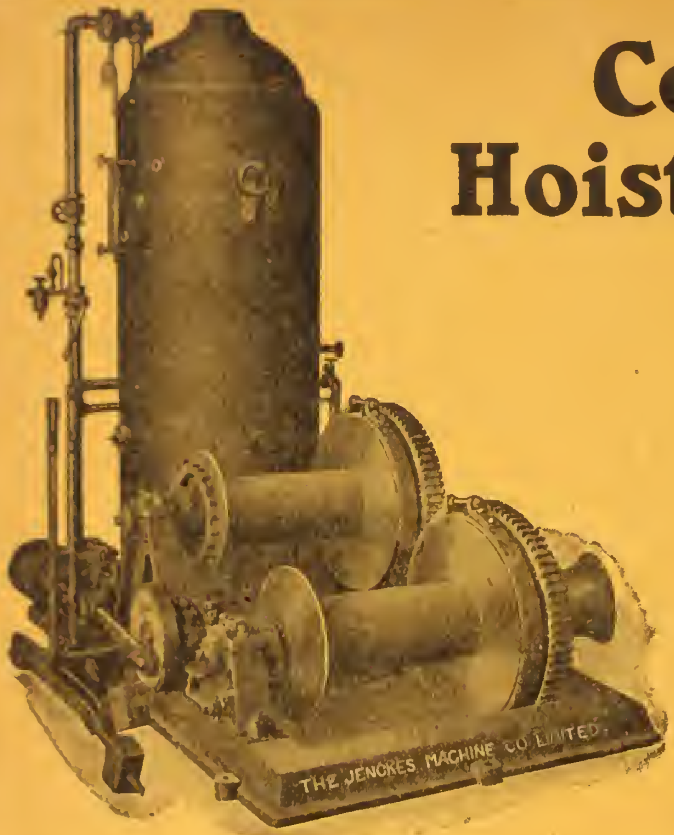

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¶ Especially designed to fully meet the peculiar requirements of Contractors' work.

¶ Great care has been taken to secure maximum strength and rigidity without unnecessary weight.

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RUSH IT—JAM IT

UP WITH WORK—THERE'S NO DANGER
OF THE

"AMERICAN" Hoisting Engine

"LAYING DOWN"

IT STANDS FIRM UNDER THE HARDEST DUTY
IT PULLS TO THE LIMIT
IT'S THE ENGINE WITH THE PERFECT FRICTION

If you need EXPERT ADVICE regarding Hoisting Engines, write us

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IF a layman asked you — an engineer or a contractor — what you thought of concrete roads, what would you tell him?

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We've saved you most of the trouble of doing so, by collecting and "boiling down" a great amount of information on highway construction and especially on concrete highway construction. This information is complete and definite. It is yours'—free for the asking.

A LETTER requesting our "Good Roads" literature will put you in possession of facts that will enable you to answer any questions on the subject of Good Roads.

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CONCRETE highways are not experiments. Their wonderful possibilities are proven by years of experience.

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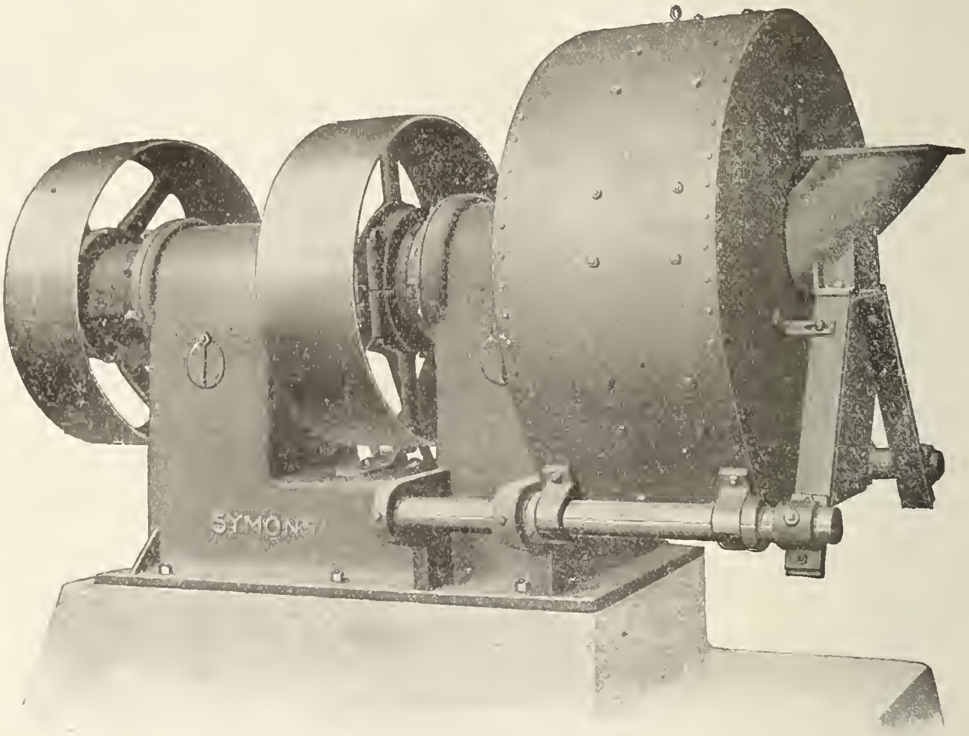

Will crush 40 tons of ¼ inch to 1,000 tons of 2½ in Stone per day.

The "SYMONS" is the only crusher which will take rejections, screened or unscre ed, from Standard Gyratory Crushers and reduce same rapidly at one operation to ¾ i size and less.

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The "SYMONS" is the only crusher equipped in every case with Manganese Cru ing Members.

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The "Carbic" Light

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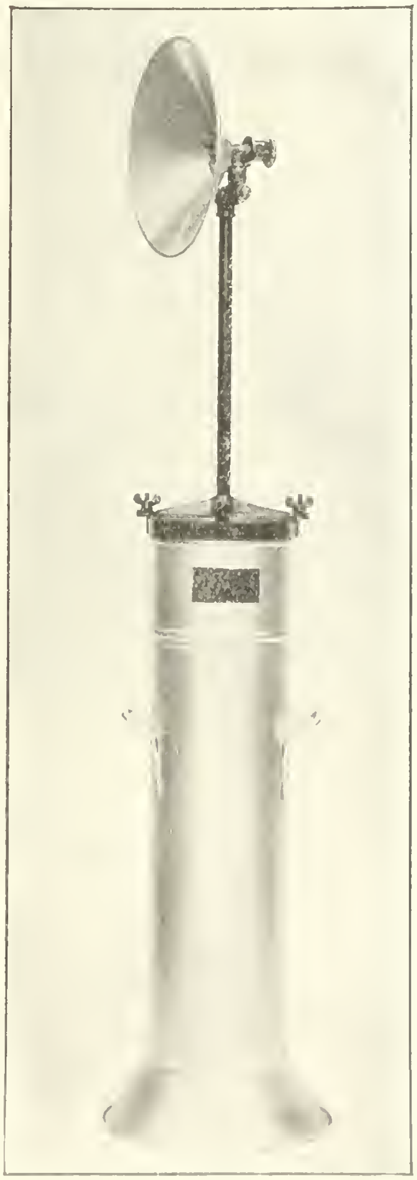

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are used in the construction of the most important public buildings erected by the Provincial Government. They are specified by the leading architects for every building of importance. The latest example of the public recognition of their superiority is found in their use for the new Toronto Residence of the Lieutenant Governor of Ontario. Don Valley Bricks possess a beauty of color and an even texture and form which add that touch of distinction to a building that characterises it as fulfilling the essentials of decorative dignity.

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FENESTRA STEEL SASH not only increases production, but also reduces costs. Window upkeep expenses and artificial lighting bills are reduced almost to the vanishing point.

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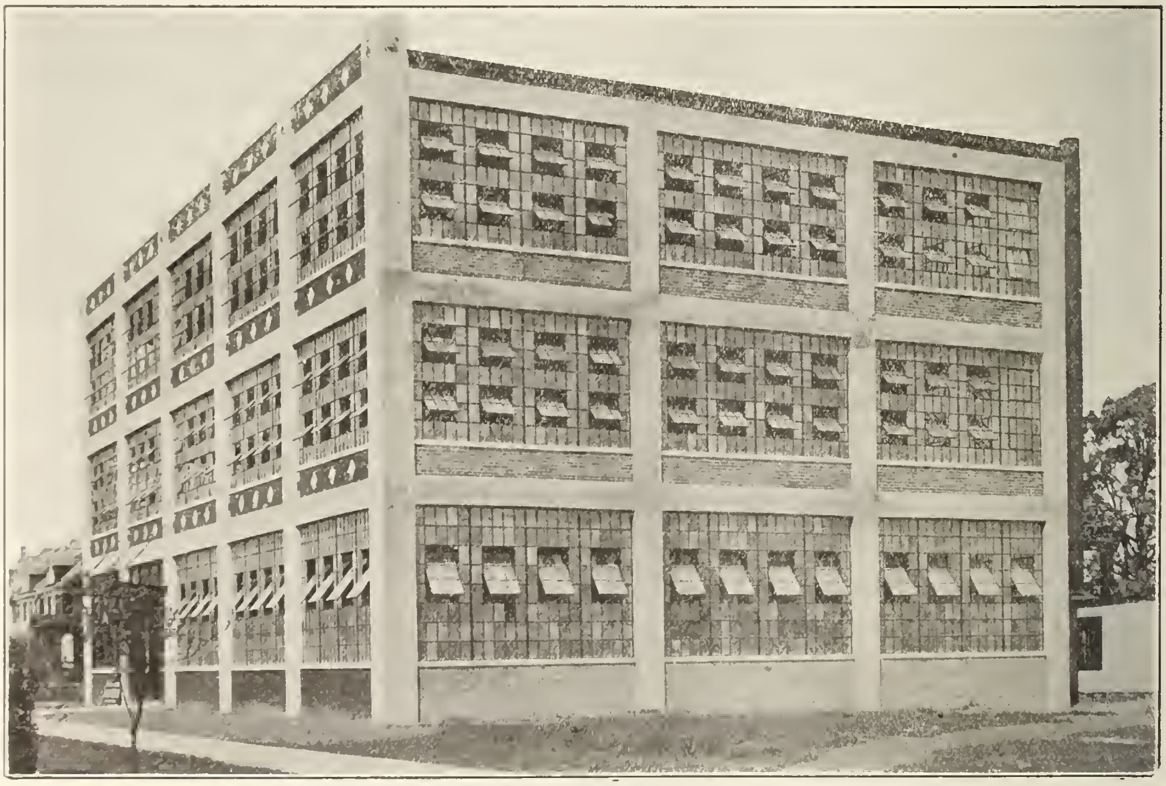

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TORONTO, CANADA

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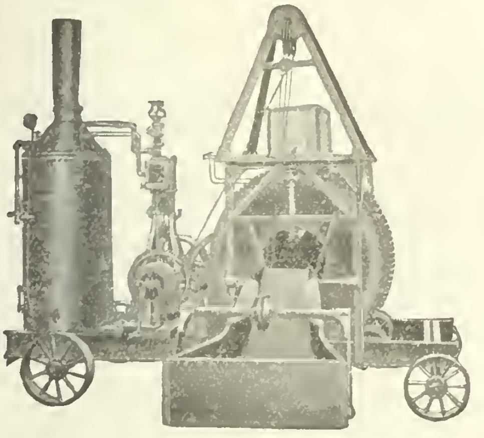
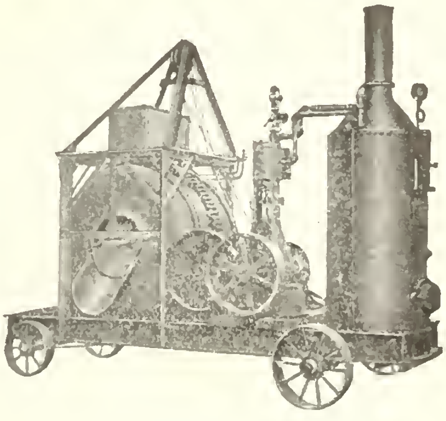
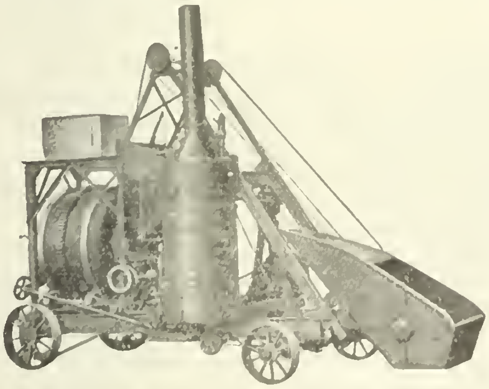

London Standard Drum Batch Mixer

must be built Strong and of the Best Material.

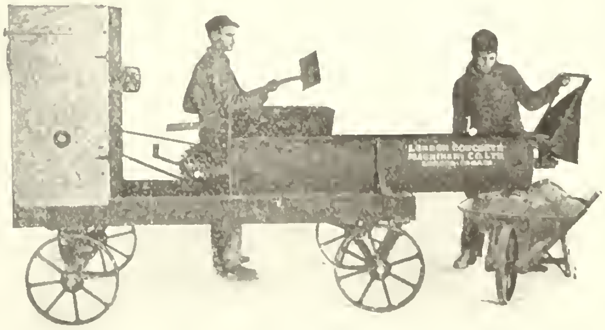
The First Cost of a Concrete Mixer is only a Small Item if it is continually breaking down.


London Standard Drum Batch Mixer

The London Mixers are built **up to a Standard** not down to a price. **By manufacturing on a large scale** we have been able to sell **High Grade Machines** at Remarkably Low Prices.


London Paving Machine with Front Loader and Rear Discharge

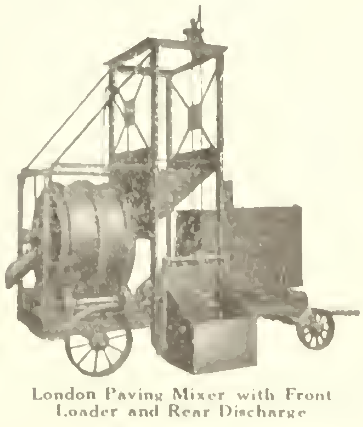
We manufacture a complete line of Concrete Machinery and Cement working Tools and Contractors' Equipment.



London Mortar Mixer

London Automatic Batch Mixer No. 1

Ask for our 1912 Catalogue. It contains information for every Contractor.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London Concrete Machinery Co. Limited

Cabell St. and Kitchener Ave., LONDON, ONT.

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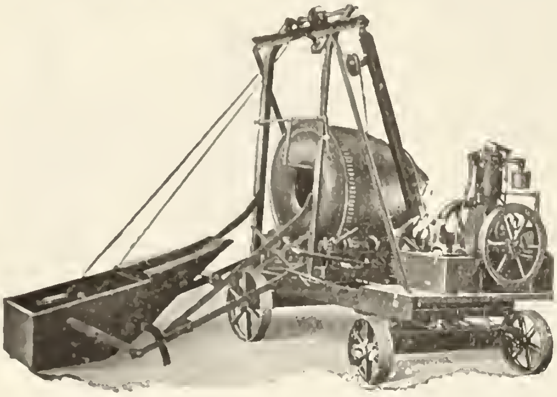
For Any Rush Job

You Are Forced to Admit

that

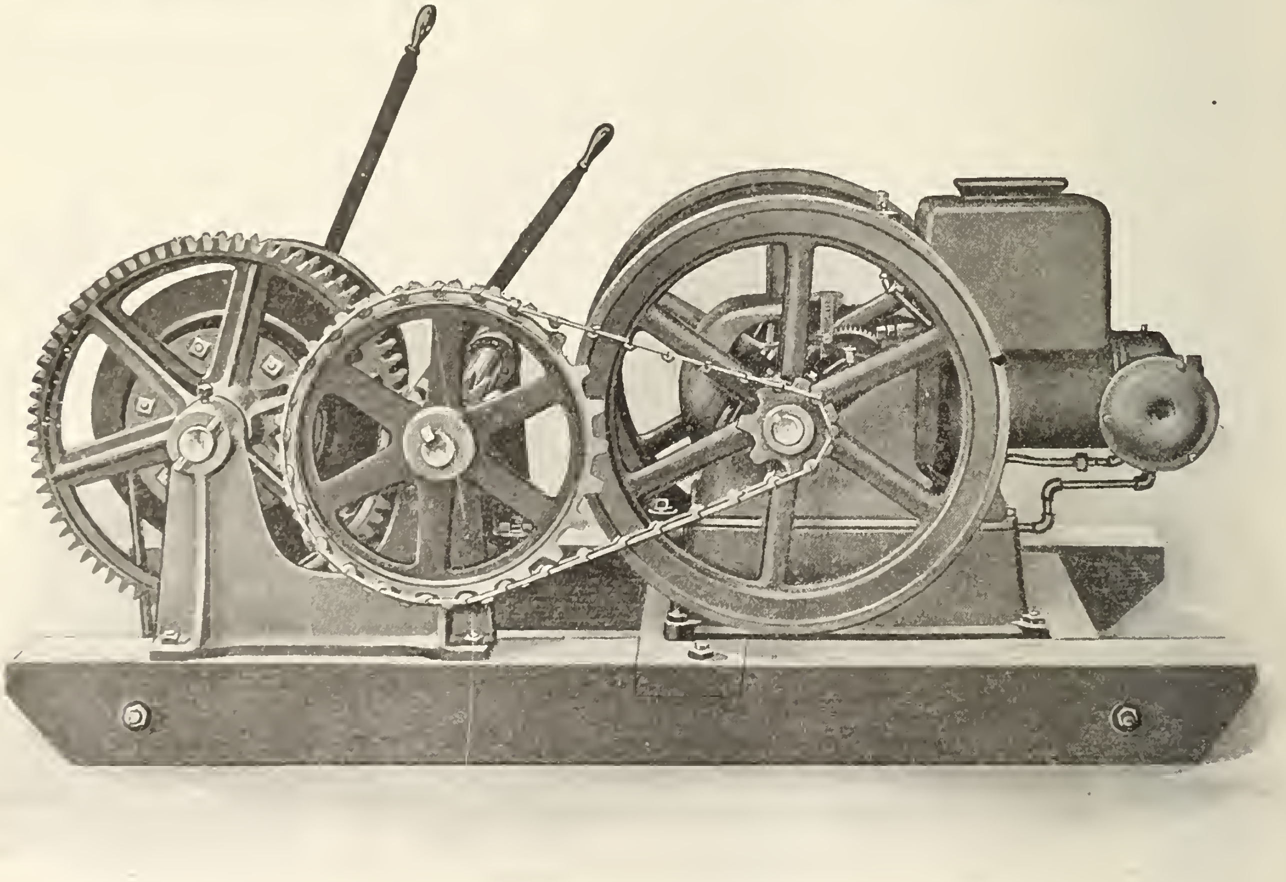
The Wettlaufer Improved Heartshape Mixer



Wettlaufer No. 1 Heartshape Mixer

will stand up to the work and see the job through with a certainty of good results that you can absolutely rely on. It will make yours a more profitable job by doing quick and perfect work with no stops for repairs.

Automatic operation—low running cost
Economical working throughout



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The most useful and complete hoist for all building and contracting purpose Its compactness size and general handiness give it great advantages over the ordinary large cumbersome hoist and enable it to be easily moved around from one part of the job to another. Its capacity for work and general utility are unlimited.

Let us send you particulars of our Hoists and Mixers—or come and see them. Continuous Demonstrations at

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(12 REASONS)

Theoretical Considerations

(1) **It possesses a high elastic limit—not less than 55,000 lbs. per sq. in.** This is not attained at the sacrifice of quality or uniformity. "Steelcrete" is not a brittle and inferior steel but a tough, cold-drawn product with no equal in the market for uniformity of strength.

(2) **It provides against concentrated loads.** Its diamond-shaped structure enables it to distribute the effect of a sudden local load over a great many strands.

(3) **Attains a perfect bond in the concrete.** This is due to its mesh shape which does not permit any slipping and there is no possibility of it.

(4) **Perfect distribution of Steel.** Every foot of width possesses the theoretical amount of steel. The accuracy here attained is impossible in loose rod reinforcement.

(5) **Longitudinal reinforcement.** "Steelcrete" mesh possesses strength in the longitudinal direction of the pipe equal to one third the strength in the circumferential direction.

(6) **Temperature stresses are guarded against.** The form of the mesh provides a positive reinforcement against these uncertain but definite stresses.

Practical Considerations

(7) **"Steelcrete" mesh is essentially a fool-proof reinforcement.** With the use of this material the man with the brains that designs the construction obtains an efficiency of 100 per cent. with ordinary every day inspection and unskilled labour.

(8) **"Steelcrete" Mesh is a stiff reinforcement.** It holds its position in the forms in a way that no other mesh equals. It is far more important to have the reinforcement placed correctly in a vertical direction than in the horizontal.

(9) **It is cheaper to install.** Requires less labour than any other mesh or system of rods.

(10) **It is easy of inspection.** Only those who know "Steelcrete" know the trouble, delay and anxiety this saves to both contractor and engineer alike.

(11) **It can be placed quickly.** This means a saving in overhead charges. This feature has been overlooked by a great many engineers and architects in the past

(12) **ALFRED ROGERS IS NOW CARRYING IN STOCK HALF MILLION SQUARE FEET OF "STEELCRETE" FOR IMMEDIATE DELIVERY.**

ROGERS

Portland Cement

makes dependable concrete—carefully ground and screened—gives a quick and strong set. Any quantity, complete shipments.

ROGERS

Crushed Stone

in all sizes—clean and free from dust, dirt and mould. Guaranteed delivery—Send us your orders for crushed stone.

ROGERS

French Caen Stone Cement

Monarque Brand and Cementa-line. Rich in appearance and of unlimited durability—as good as natural stone but cheaper. Full particulars on request.

Quotations made for all Work—Prompt Deliveries and Complete Shipments given from Stock

Alfred Rogers Limited

28 King St. West
Toronto, Ontario.

Western Sales Manager
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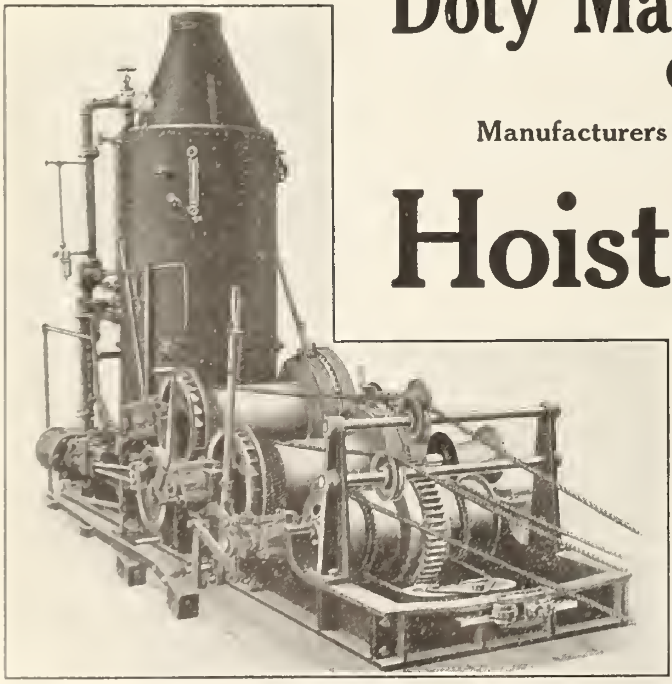
The

Doty Marine Engine & Boiler
Company Limited

Manufacturers of **Superior**

Hoisting Engines



This cut illustrates our Standard Double Cylinder Double Drum Hoisting Engine with Derrick Swinger attached. "Superior to any other on the market." All parts constructed, guages and templates and every engine tested under steam.

Derrick Swingers, Material Elevators, etc.

for

Contractors, Mines and Quarrymen

A full line of Hoisting Engines, with Boilers to pass inspection in any province, kept in stock by The Doty Engine Works Co., Winnipeg, Man., and also at our

Works—GODERICH, ONT.

To buy our Engines is a Guarantee of Satisfaction

Sawyer Belt will stand any weather

Exposure is the cause of many belting troubles. Neither leather or rubber belting, though expensive will stand both rain and shine.

Here is where **Sawyer Canvas Stitched Belt** shows its superiority. The compound in which it is immersed renders it pliable under all conditions.

It costs less—It wears more.

Try it in rain or shine

Sawyer Belting Co.
Cleveland, Ohio

In Building Canals

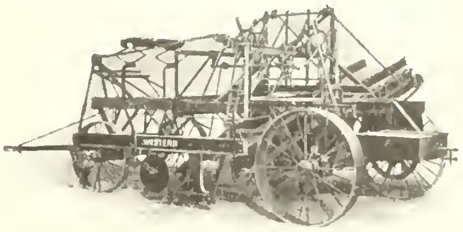
Excavating Ditches, Reservoirs, Loading Wagons, Building Levees, Embankments, etc., there's an unequaled saving in using the sturdy

Western Elevating Grader

Will move 1000 cubic yards per day. Free from complicated parts. Built strong. No annoying breakdowns. Has made records as to strength and durability. There are many "reasons why" you need the Western Elevating Grader. Our Catalog will tell you.

Write today.

Western Wheeled Scraper Co.
Aurora, Illinois
Earth and Stone Handling Machinery



Hagersville Crushed Stone

The Toughest Stone for Macadam in Ontario

Record of Logan Avenue, Toronto, Macadamized from Queen St. to Gerrard St., in 1902
Length 2,454 Lin. Ft. Width 24 Lin. Ft. 6,550 Sq. Yds.

COST FOR REPAIRS				
	1903	$ 0.00	1908	$ 93.26
	1904	3.30	1909	200.46
	1905	9.35	1910	14.07
	1906	37.33	1911	2.29
	1907	16.11		

Total $376.17 or 5⅔c. per sq. yd. for repairs for nine years, a little over 6-10 of 1c. per sq. yd. per year.

Why Not Use Hagersville Stone and Get These Results?

Hagersville Contracting Co.
Hagersville, Ont. Limited

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"PIONEER" Highest Quality ASPHALTS
TRADE MARK

The 16 year record of "PIONEER" ASPHALTS is the best assurance an Engineer can have as to their efficiency, permanency and economy. Specify "PIONEER" ASPHALTS

For Asphalt Macadam Roads, Asphaltic Concrete, Sheet Asphalt Paving—and Filler for Brick and Block Pavements

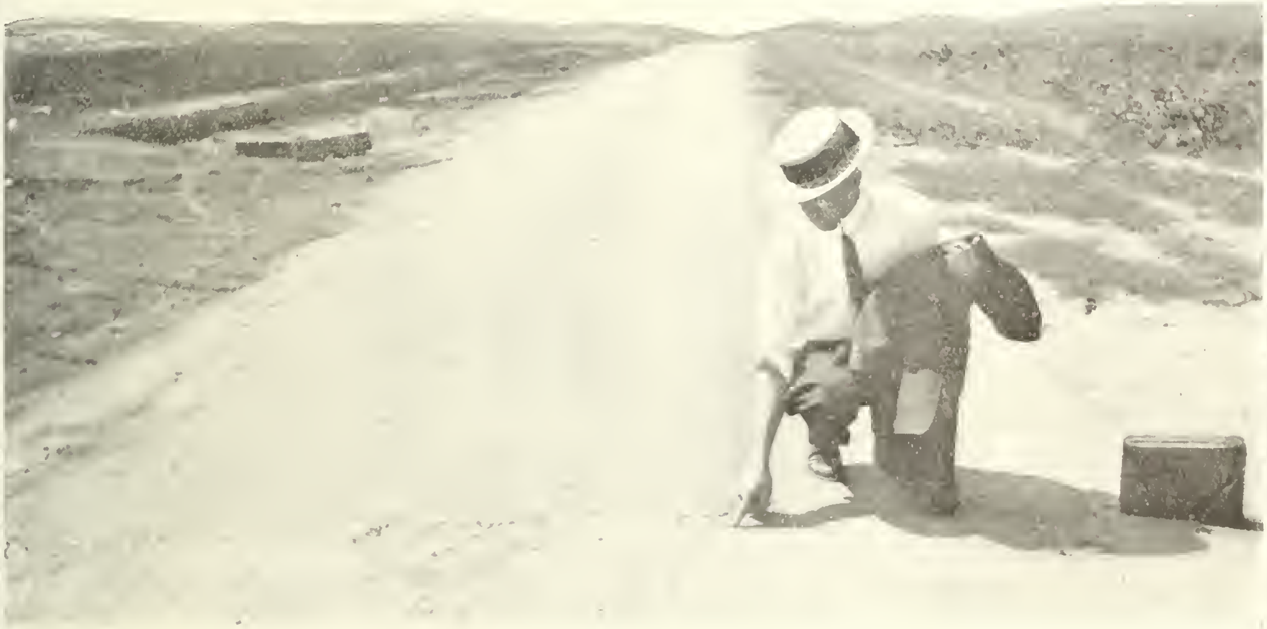
and results will be highly satisfactory. "PIONEER" ASPHALTS are 99.5 per cent. pure bitumen. They are waterproof and weatherproof. Can be used for all purposes where an asphalt can be used.

Write for Specifications

THE CANADIAN MINERAL RUBBER CO., Ltd.
Canadian Express Building, MONTREAL
503 Canada Building, WINNIPEG

Tarvia

Preserves Roads
Prevents Dust~



Country Club Road, Greenville, S.C. Built with Tarvia X

What the Goverment

Found Out About Tarvia

The Office of Good Roads, U. S. Department of Agriculture, built an experimental road at the country club at Greenville, S. C., in 1909, following very closely our specifications for two coat penetration work, using "Tarvia X."

After two years the above photo of the road was taken at a point where it adjoins a stretch of plain macadam. The intention of the Department was to find out just how much difference the tarvia treatment made.

The picture tells the story. The plain macadam in the foreground is **worn out.** The tarviated surface is in **perfect condition** and the difference is so great that a clear division line is seen in the above photograph.

This is a typical instance of the success of Tarvia as a road binder. A tarviated road is automobile proof, waterproof, dustless and mudless. It is so much cheaper to maintain that the cost of using Tarvia in the construction is more than compensated for.

Tarvia is made in three grades:

"Tarvia X" for use in constructing roads and pavements.

"Tarvia A" for hot surface application.

"Tarvia B" (applied cold) for dust prevention and road preservation.

Tarvia booklet mailed free to anyone interested. Address our nearest office.

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MONTREAL TORONTO WINNIPEG VANCOUVER

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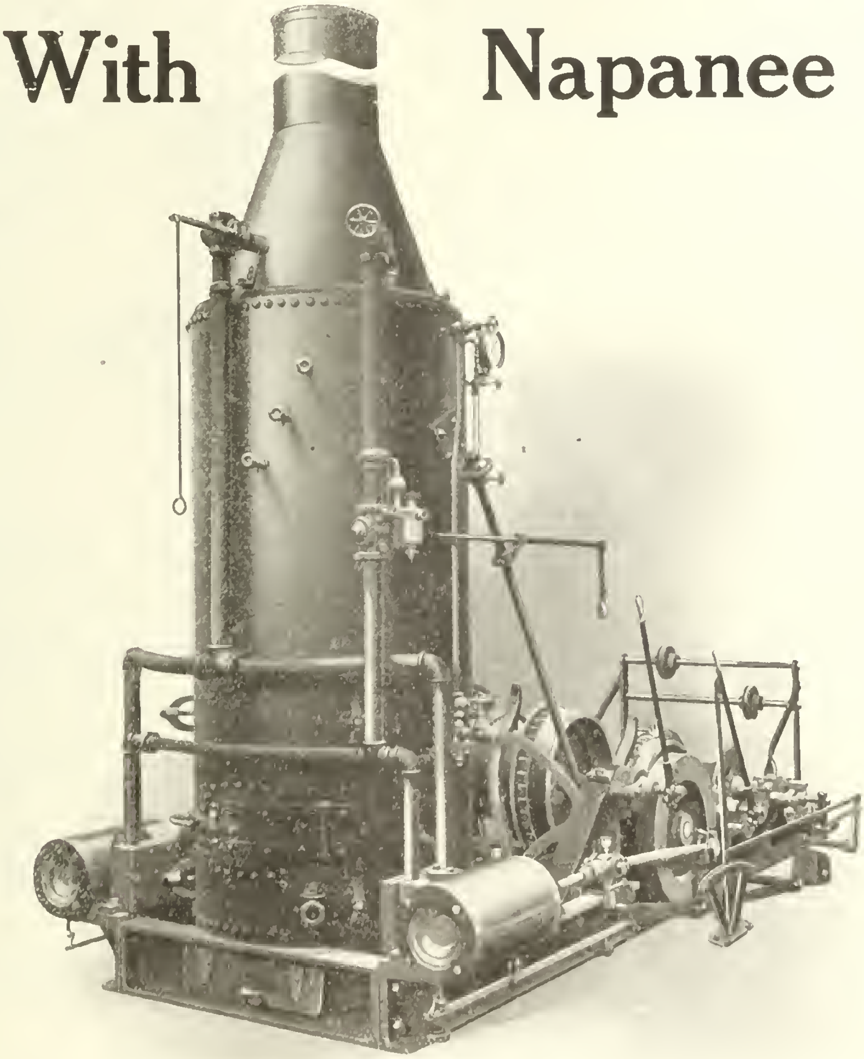
"Hoist" Your Profits

With Napanee Hoists



SHIPMENT FROM STOCK

of standard sizes of rock drills and hoists with or without boilers

For information and prices please address our sales managers:
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Napanee Iron Works, Limited

Napanee - Ontario

WANTED:—Salesman and engineer having experience with hoists and rock drills.

Contractors' Acetylene Flare Lights

Made in Two Sizes

SIZE NO 1—

8,000 Candle Power, operates 12 Hours on 18 lbs. Carbide.

Price F.O.B. Ottawa $95.00.

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1,000 Candle Power, operates 12 Hours on 8 lbs. Carbide.

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Manufactured by

International Marine Signal Co. Limited
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Neptune Meter Co.

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TRIDENT Frost-Proof Water Meters

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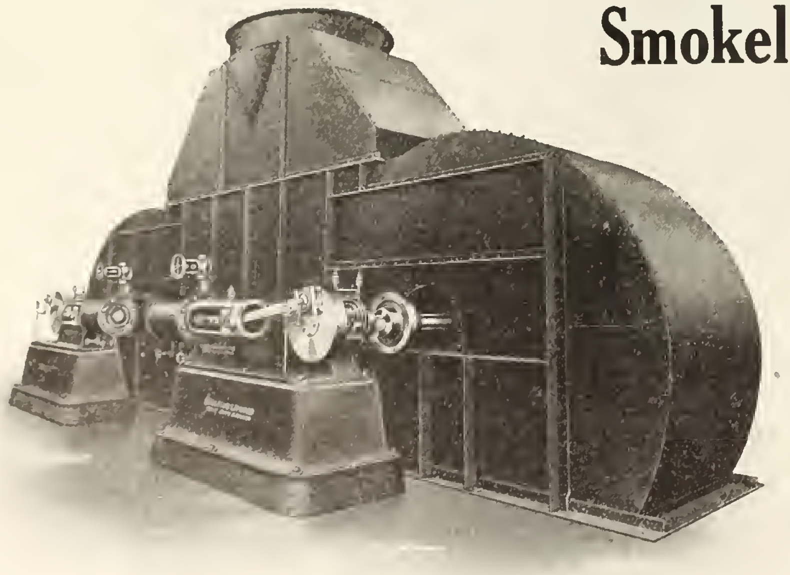

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Makes possible the thorough Combustion of the Cheapest Fuel with increased Boiler Capacity.

Moderate in Cost, efficient in operation and all independent of Atmospheric Conditions.

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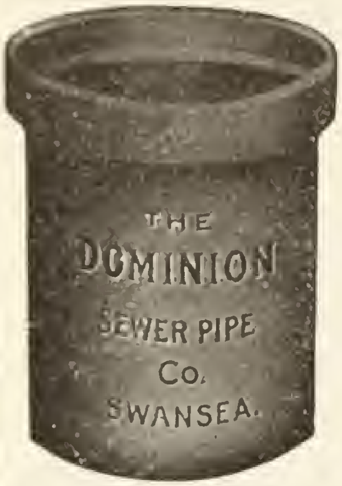

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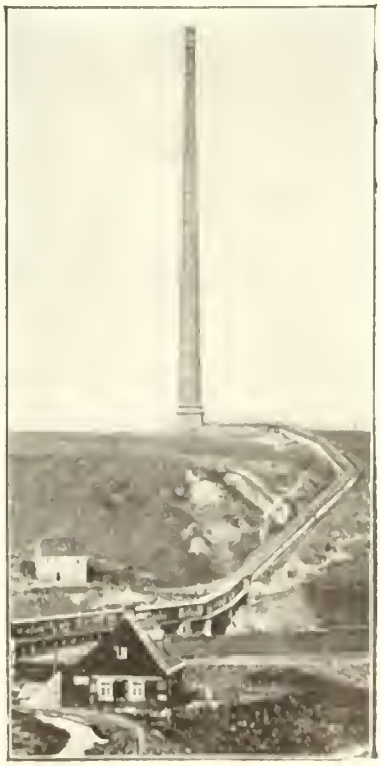

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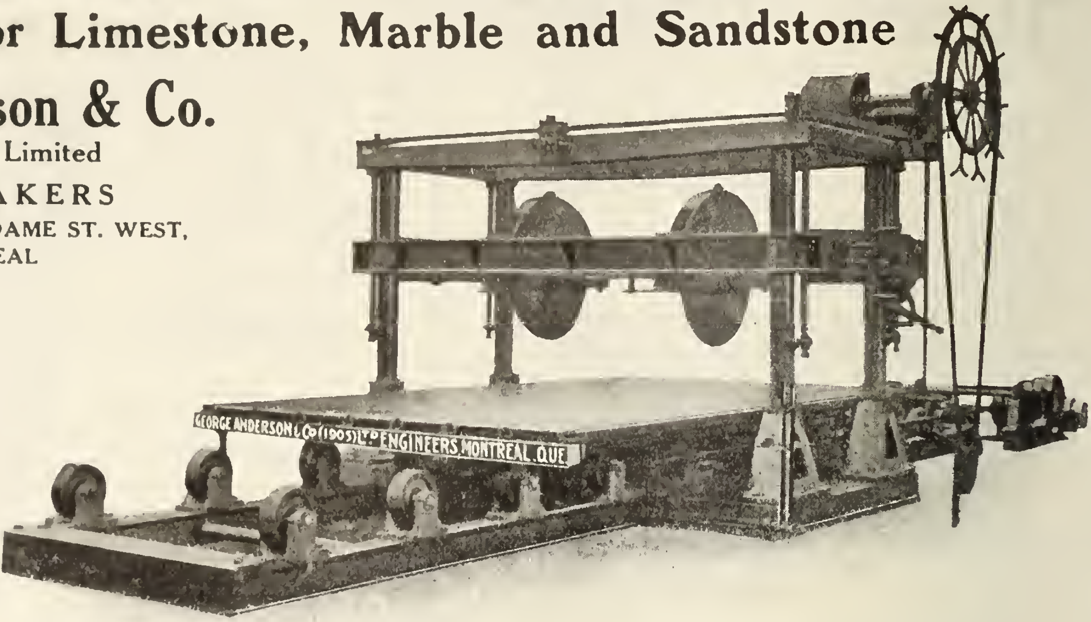

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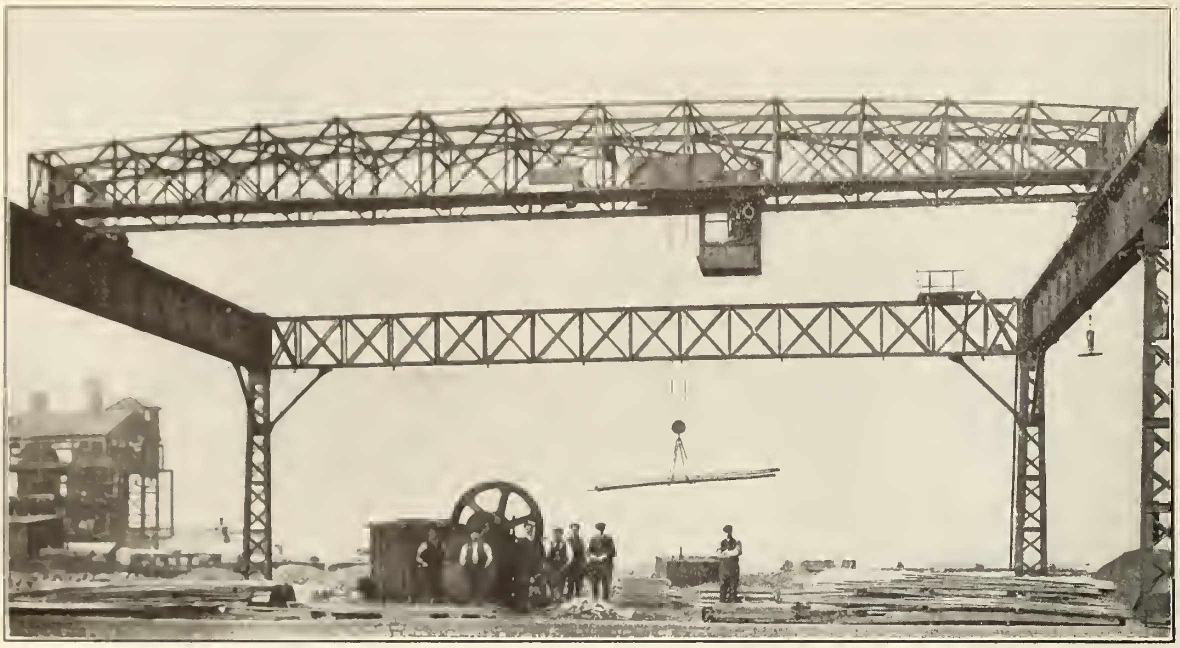

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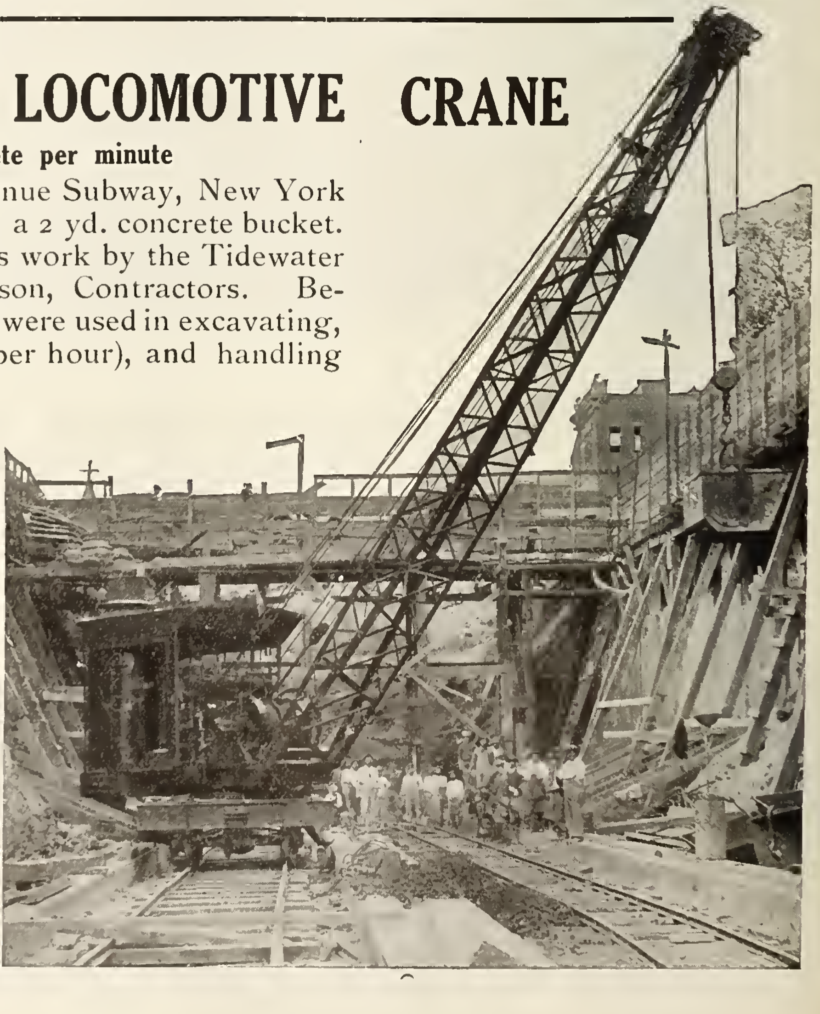

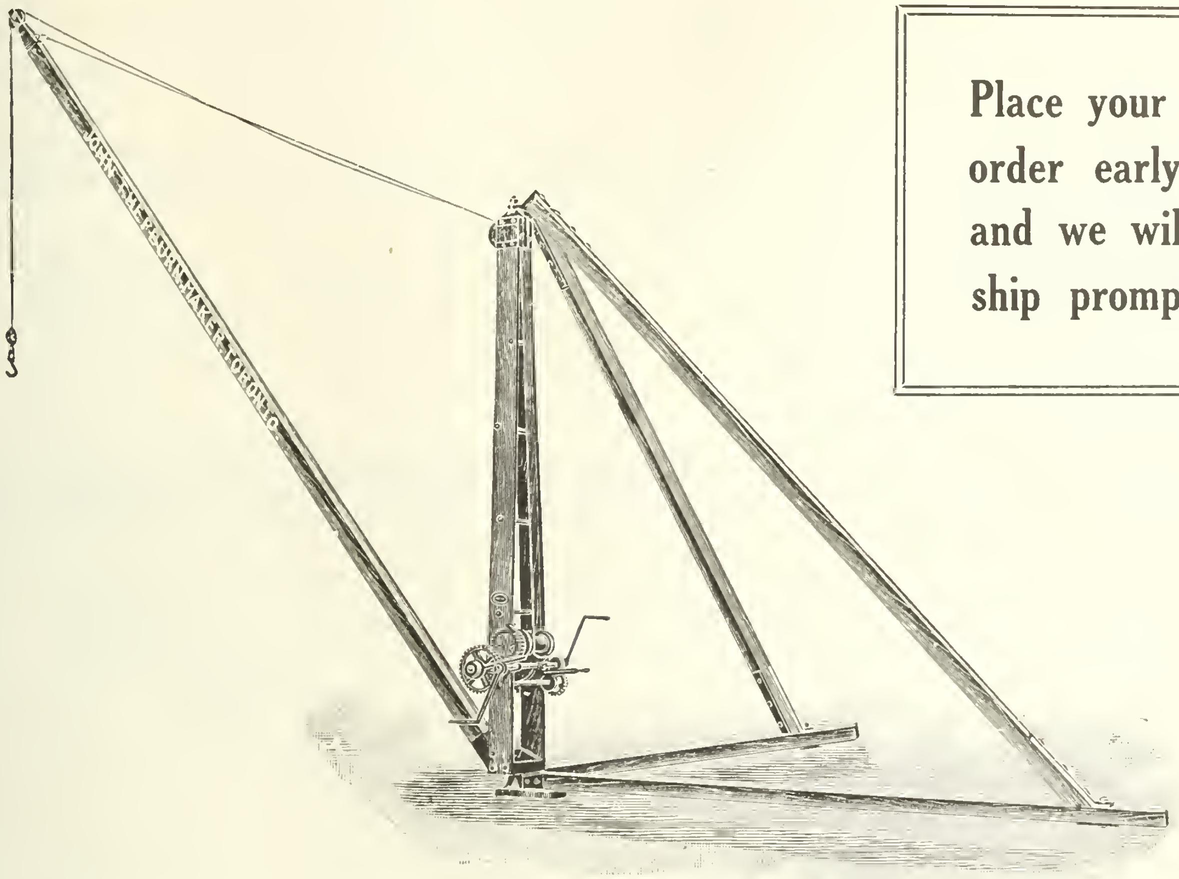
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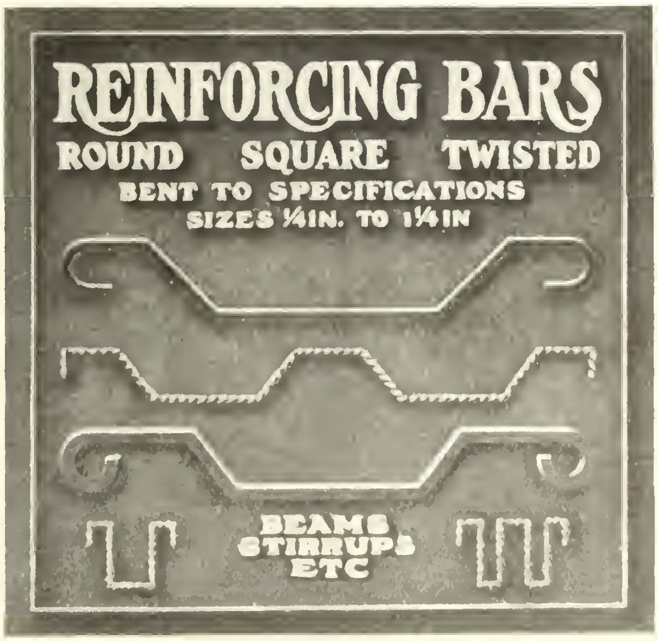
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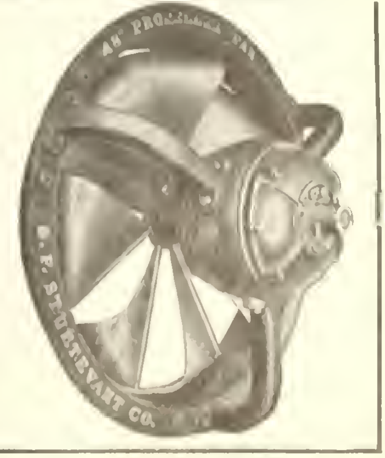

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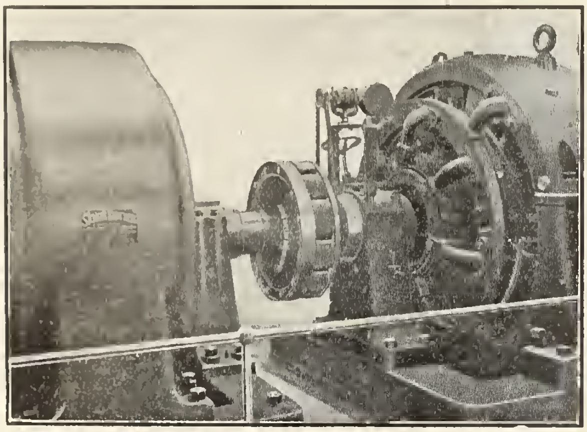

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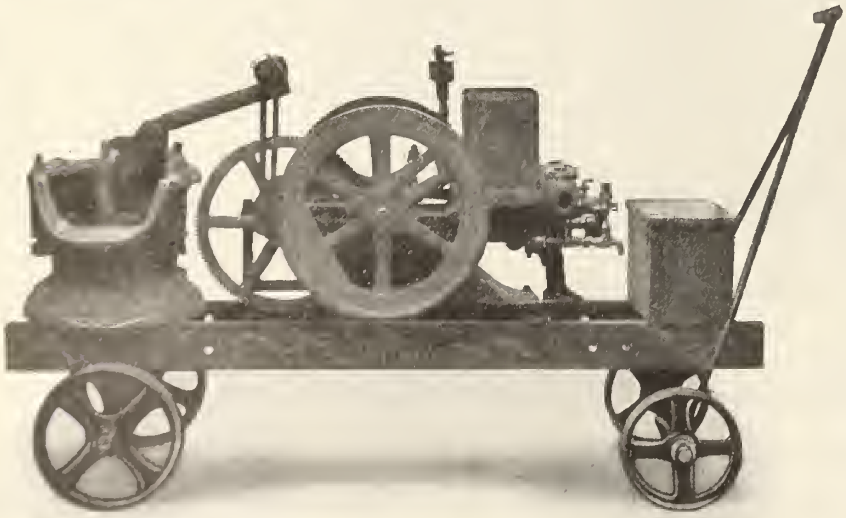

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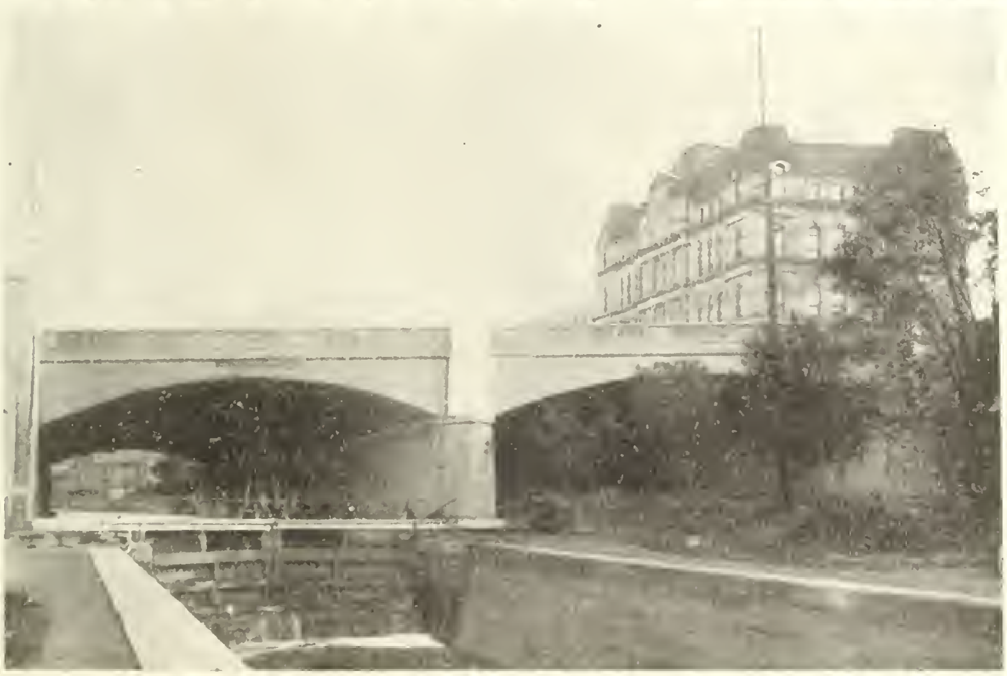

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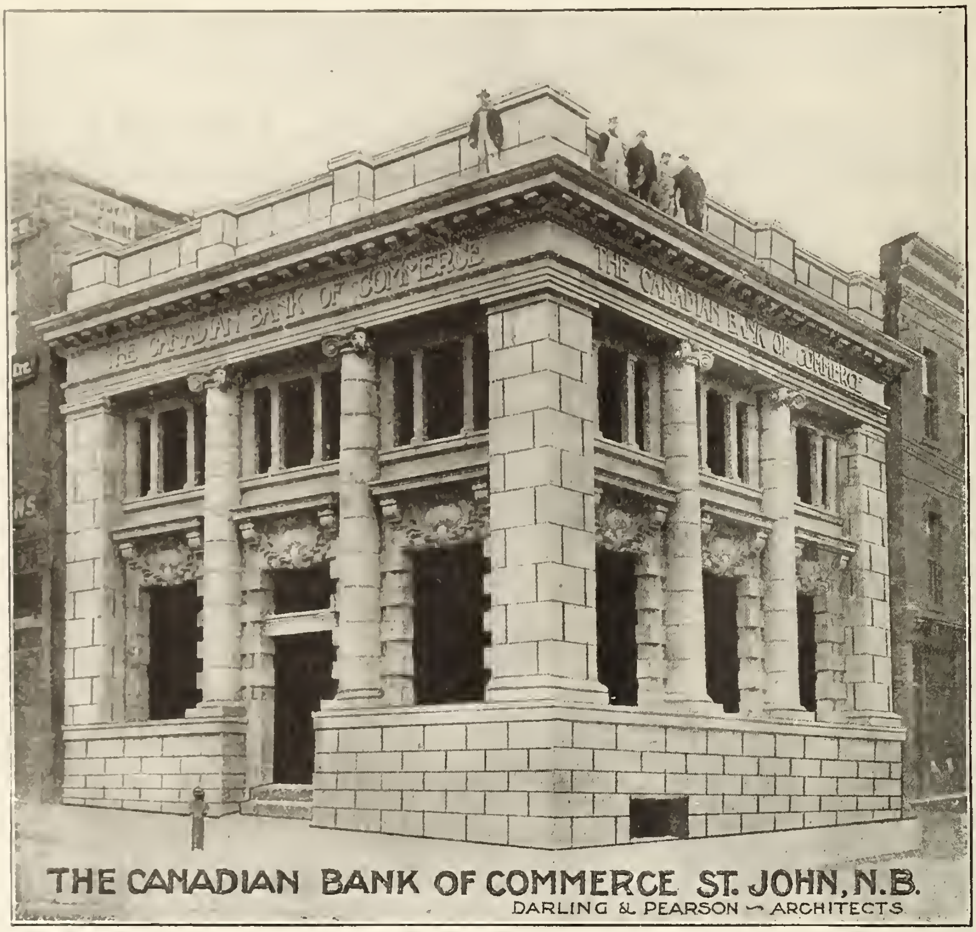

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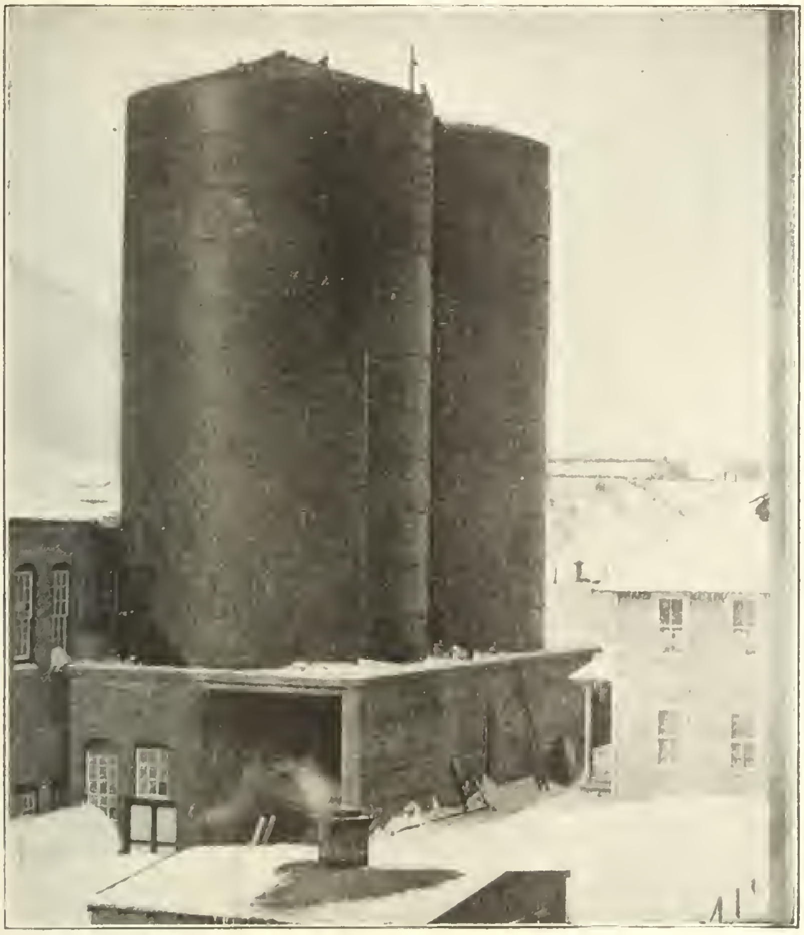

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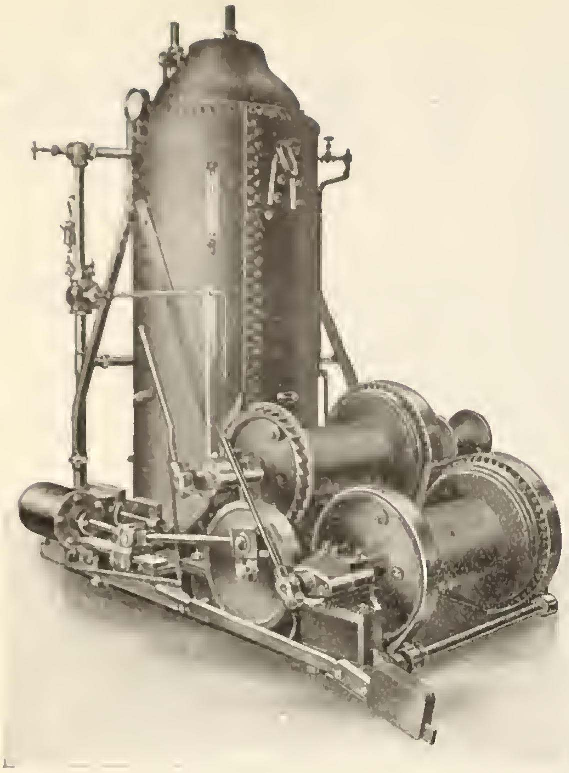

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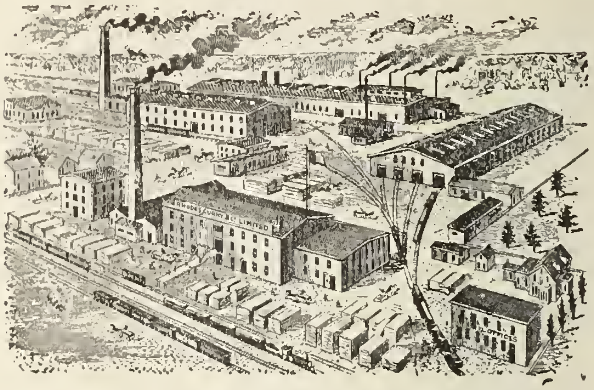

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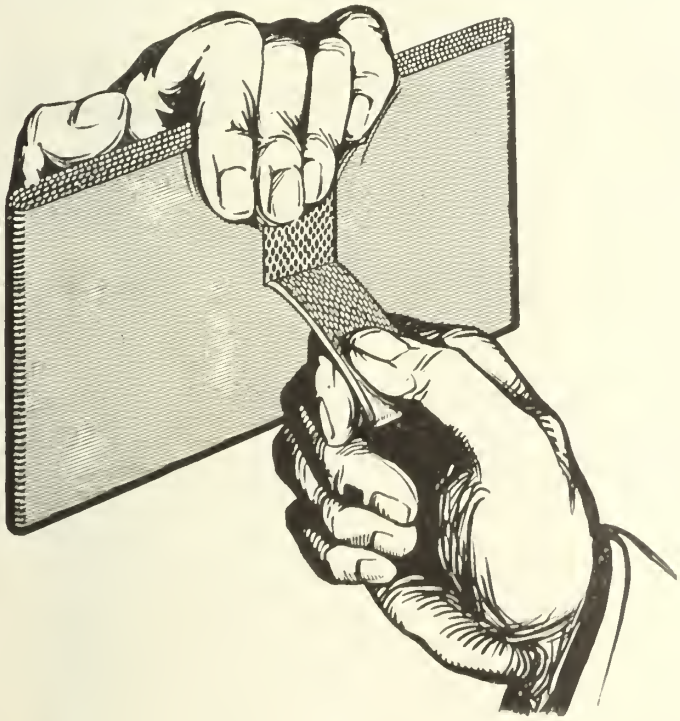

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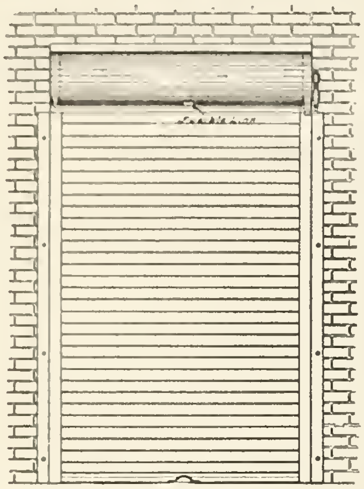
Steel Rolling Doors and Shutters



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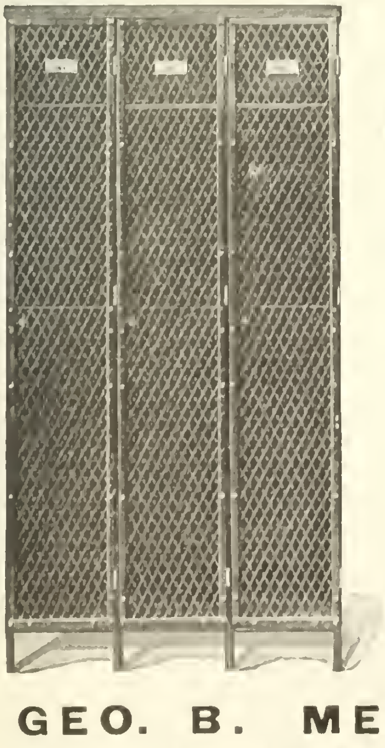

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ESTABLISHED 1886

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Vol. 26 December 25, 1912 No. 52

The Home Product in Canadian Engineering Works

ON more than one occasion we have protested against the employment of foreign engineers, particularly by municipalities, to the exclusion of Canadians and those of British birth. Canada needs the best men she can secure, and no doubt there are instances where it is advisable to secure men, especially for reports and in a consultative capacity, from the other side of the border. We readily recognize this, but the point we have emphasized is that municipalities have been too ready to overlook the claims of our own people, and have been hypnotised into appointing outsiders who have no higher qualifications than those who are of our own kith and kin. The question has now been taken up by the Canadian Society of Civil Engineers on strong complaints from the Victoria and Vancouver Branches of that body, and pressure has been brought to bear on the Federal Government (through letters to the Premier and the Ministers of Public Works and of Railways and Canals) and also on the Premier of British Columbia.

Three instances are complained of first the appointment of foreigners by the British Columbia Government in connection with Strathcona park; second, the appointment of an outside engineer by the city of Victoria; and third, the, proposed employment of a U. S. engineer by the Dominion Government in connection with a projected bridge over the Seymour Narrows.

The Victoria and Vancouver Branches of the Canadian Society of Civil Engineers thought it was time to act, and in addition to passing resolutions, they complained of this neglect of Canadians to the Council of the Society in Montreal. The result is the passing of the following resolution, which has been sent to the Federal and British Columbia Governments:

> "The Council of the Canadian Society of Civil Engineers, after full consideration of the representations made by the Victoria and Vancouver Branches of the Society, resolves that, while the Council, acting on behalf of the Society, has no desire to suggest that important engineering positions should be filled by any but the most competent and experienced men available, it is strongly of opinion that in as far as possible every opportunity should be given to Canadian engineers to carry out the engineering works of the Dominion.
>
> "The Council would, therefore, respectfully suggest that all engineering appointments be given most careful consideration with a view if possible of securing available Canadian engineers for important projected public works."

This is a moderately worded resolution, and does not claim the exclusive employment of Canadians. To do so would be foolish, for there are departments where Canada can avail herself with profit of the experience of foreigners having reputation and experience. The resolution is, as a matter of fact, directed against the slighting of Canadians in instances where they are perfectly competent to do the work—and there have been too many cases of this disregard of men with excellent credentials. It is bad enough that municipalities should go outside the Dominion for men when we have capable engineers available, but it is astounding that the Dominion and Provincial Governments should follow this pernicious example. Our policy should be in the direction of encouraging our own, and of helping the hundreds of Canadians who are qualifying for all branches of the engineering profession. The protest of the Council, composed of men of the highest standing, is timely, and will help in securing fair play for those of Canadian and British birth.

Remarkable Procedure in the Award of School Contracts at Calgary

EASTERN cities still hold the palm for civic mismanagement, but the administrative methods of certain western cities are not above reproach. Facts concerning the award of school contracts at Calgary that have recently come to light reflect anything but creditably upon the stability and principle of the Calgary School Board. The facts are supplied to this journal by one of its readers but they are substantiated by local press reports. In February last a contract was let to an outside firm, that we will call A & B, for the erection of a school in South Calgary at a price of $172,000. For the same work a local firm, C & D, submitted a figure of $167,000. Thus a contract was awarded to outsiders at a figure $5,000 higher than that of local competitors. Both firms were on a good footing, financially and otherwise, so that naturally the award did not please the local firm, who made such a vigorous protest that the next time contracts were let they were given a "plum" as a consolation prize. The "plum" consisted of a contract for a school building awarded to them at $125,620, when the outside firm, A & B, this time underbid them by $620. No complaints were received in the second instance from A & B. Indeed they were in no position to make any disturbance seeing that they had obtained the better of the two deals to the extent of more than $4,000.

A peculiar feature of the case, as will be seen from the above facts, is that these two firms in erecting two school buildings collected between five and six thousand dollars more for the work than they actually proposed to do it for. Our correspondent informs us that lower bids might have been obtained than were submitted by either firm, and in respect to the second contract, awarded to the local firm, he says that three weeks later tenders were taken under the same plans for a duplicate building the contract for which was awarded at a figure $10,000 lower than the other. It would be interesting to know how the Calgary School Board treated this last tenderer: whether they raised the amount of his bid or held him to his figures.

The Chairman of the Calgary School Board is Mr. [illegible] A. Sinnott, and the Secretary, Mr. Jewett. Perhaps these gentlemen will be sufficiently interested in the matter to give us some elucidation upon the mysterious procedure outlined above, but at any rate we feel it to be our part, with the information available, to give some publicity to the affair so that our western readers may not think that the perpetration of such offences can pass unnoticed. Civic affairs should bear investigation down to the remotest dollar. Any influences that tend to the concealment of transactions effected with the money of the ratepayers should be removed.

Possibly Calgary is experimenting with the suggestion of awarding contracts to the "lowest tenderer but one," made by a reader of this journal some years ago. If so, Calgary has given conclusive proof that the possibilities of wrong under such a system far outweigh its solitary advantage of eliminating occasional inefficiency on the part of the lowest bidder.

At present Calgary is aroused over an attempt to saddle the city with an $800,000 bridge without competitive bids. We may have occasion to comment upon that matter later on. For the present we must content ourselves with an expression of opinion on Calgary's school contracts, the evidence concerning which would appear to be complete.

A canyon crossing, 455 ft. below the hydraulic grade of the Los Angeles aqueduct, has to be made. The formation in this section is massive granite and the scheme adopted for running the conduit across the gorge, as described in the latest annual report of the chief engineer, Mr. William Mulholland, consisted in driving inclined shafts in the massive granite formation at either side of the canyon and then running out horizontally to a level with the bed of the canyon. These tunnels on either side will be connected by means of a steel pipe which will be carried into the rock formation where the rock cover is 100 ft. in thickness over the tunnel. The steel pipe is 890 ft. long and the inclined tunnels 2788 ft. long and 11 ft. in diameter. The tunnels and inclined shafts have been excavated and will be lined with concrete.

A portable water tank for supplying water to narrow-gage construction locomotives has been used on several pieces of work by Messrs. H. A. and R. L. Culbertson, of Cleveland, O. The tank is of such a size as to rest on a standard flat car, and a locomotive crane is used to transfer it from the car to the foundation piers at the water station. Locomotives on either of two adjacent tracks are fed from the tank, the far track being supplied by a 3-in. pipe suspended horizontally at such an elevation as to clear a locomotive on the near track.

Fire Prevention at Montreal

THE Montreal branch of the Canadian Manufacturers' Association have taken action with regard to safeguards from fire, to which reference was made in an editorial in our issue of December 4. The Council of the Association have been asked to appoint a sub-committee to act with other bodies in the city for the purpose of establishing a committee to open a propaganda to stir up public interest and to get public action taken in the direction of preventing the appalling fire waste annually taking place on this continent. At the meeting at which it was decided to deal with this matter, Mr. F. Wentworth, Secretary of the National Fire Protection Association, Boston, told how Canada and the United States were behind Europe in fire prevention, and what was being done to educate people in construction and equipment. The erection of very tall buildings should be prohibited, while shingle roofs ought to be done away with. Mr. Tremblay, head of Montreal's fire department, advocated the expenditure of $50,000 by Montreal for inspection work in order to prevent fires. He condemned some of the ten-storey structures that had gone up recently in Montreal.

Supply Market and Outlook

NOW that the season's building operations are nearly completed, it is gratifying to note the optimism expressed regarding prospects for the new year. The year 1912 has created a record in building permits all over the Dominion and in many instances enormous increases have taken place over any previous year. All indications at present point to a continuance of these increases in 1913. The chief point for congratulation, however, is that the abnormal building which is going on is not in the nature of a boom but rather an endeavor to meet the actual demand for residences and business premises of all kinds. Not only has difficulty been experienced by builders during the past year in obtaining a sufficient supply of labor, but dealers and manufacturers of builders' supplies have, in many cases, been unable to meet the unprecedented demand for all kinds of materials and in spite of the time which will elapse before building operations are in full swing again, it is doubtful if they will be ready to fill all the orders which they have on hand. In view of these conditions it is not surprising that prices in general are very firm and there does not seem any likelihood at present of any material decrease.

The demand being so large all round, it is hardly possible to mention any particular line as worthy of special comment. Brick manufacturers have been working full time to fill their orders for all classes of brick and a number of them will keep their yards working all through the winter in an endeavor to have some stock on hand. There is a noticeable call for fancy bricks, the demand for which is increasing. There has been a shortage of glass all over the Dominion and very little relief is expected until navigation opens at Montreal next season. Steel, also, is very scarce just now and prices remain very firm with, if anything, an upward tendency. The heavy demand in the United States is responsible for this to a considerable extent. Iron pipe and fillings are very steady, but lead waste and lead goods are rather inclined to fluctuate.

Disintegration of Concrete in Sewage Disposal plants

An investigation into the production of excessive hydrogen sulphide in sewage disposal plants and the consequent disintegration of the concrete used in their construction has recently been conducted by Messrs. William M. Barr and R. E. Buchanan at the Engineering Experiment Station of the Iowa State College. The results of this investigation, summarized below, have been published in the bulletin of the station.

Examples of this action have been observed at numerous sewage plants in various parts of the country, and at the plant of the Inebriate Hospital at Knoxville, Iowa, the following conditions were observed: The concrete composing the roof of the dosing chamber and the portion of the walls above the high water line was found to be rapidly disintegrating. The under surface of the roof was decomposed to a depth to two or more centimeters and quantities of free sulphur were found deposited on the walls, while the calcium compounds of the cement had been converted near the surface into crystals of calcium, sulphate or gypsum. Large quantities of hydrogen sulphide were given off when the dosing chamber was discharged, causing a considerable nuisance in the vicinity of the hospital.

With a view of bettering the conditions a water softening plant was installed, but aside from making the water more desirable for domestic purposes it had no other effect. Moreover, frequent cleaning of the tank and disinfection at the time of cleaning did not materially help matters. In conducting the investigation, it was assumed as a working hypothesis that a definite relation existed between the amount of sulphur compounds in the water supply and the formation of excessive hydrogen sulphide in the disposal tank. This was deemed justifiable for the following reasons: (1) It had been observed that the water supplies in the cases under examination showed an unusually high content of sulphates. (2) The odor of hydrogen sulphite was in all cases very pronounced in the dosing chamber. (3) Free sulphur was found floating on the surface of sewage which had been standing for any length of time and was also found deposited on the walls in various parts of the septic tanks. (4) A bacterial examination showed an abundance of sulphur bacteria, that is, bacteria capable of oxidizing sulphates to sulphides. (5) The disintegrated concrete exhibited a much higher content of sulphates than that unaffected and, as already stated, showed gypsum crystals under the microscope.

In all septic tanks there is a certain amount of hydrogen sulphide formed by the decomposition of protein substances, but a chemical analysis of the raw sewage and effluents from these tanks indicated that there was not enough sulphur present to produce the quantities of hydrogen sulphide observed. It was also noted that where the sulphates in the original water supply were high there was a marked reduction in the amount of mineral sulphates found in the effluent, showing that a portion of these mineral sulphates must have been reduced and removed from solution. It was thus felt that much of the hydrogen sulphide developed in the tank was formed by the de-oxidation of these sulphates.

Previous investigations have shown that certain bacteria found in sewage have the property of reducing sulphates to sulphides and the bacterial analysis of the sewage in question showed an abundant growth of one of these classes of bacteria. These were found in some cases on the surface of the scum in the tanks and also on the outside of the disintegrated concrete. An examination of the dosing chamber of the tanks showed that the moisture on the walls contained sulphuric acid in considerable strength. A portion of this could be accounted for by the atmospheric oxidation of the hydrogen sulphide, but it appeared to the investigators that hydrogen sulphide alone could not be charged with responsibility for the formation of the sulphuric acid.

It was also observed that the concrete below the water line of the septic tank in the dosing chamber had disintegrated but little or none at all. It was found that under these conditions there was little evidence of the presence of the oxidizing bacteria. A study of the bacterial processes has shown the first evidence of such oxidation to be the accumulation within the bacterial cell of granules of free sulphur. These organisms are found later to further oxidize this sulphur, the final product being sulphuric acid. As rapidly as sulphuric acid is produced by bacteria working in or on the concrete or by atmospheric oxidation, it reacts with the calcium compounds of the cement, forming calcium sulphate of gypsum. This takes up water of crystalization and in so doing expands, resulting in the disintegration of the concrete.

Some Features of Macadam Construction

By T. R. Agg, Engineer, Illinois Highway Commission

In deciding upon the size of the pieces of stone to be used for the upper layer of water-bound macadam two things must be taken into consideration—the quality of the stone and the amount and character of traffic. A road surface carrying a medium or light traffic, of which a small per cent. is motor traffic, can obviously be made of smaller sized pieces of stone than a road surface carrying traffic made up of a great many heavily loaded horse-drawn vehicles, together with a large number of motor vehicles.

If the pieces of stone in the surface of the road are so small that the wheels passing over them crush them, it is inevitable that rapid wear will result. If the surface of the road is made of very large stones the traffic will not crush them nor even wear them with sufficient rapidity to supply fine material to fill the interstices. In such a case the road will become rough and uneven. Somewhere between these two extremes lies the ideal size of stone to use. In the work of the Illinois Highway Commission it has been found that with soft limestone available the size ranging from 2½ to 2¾ in. is most satisfactory. If screenings are spread before the stone has been thoroughly rolled they only serve to separate the larger stones. The resulting surface is made up of individual stones set in a pocket of screenings and is not as durable as one made of stones firmly locked together by rolling before any screenings are spread. The durability of the surface will be greatly enhanced if it is covered to a depth of about ¾ in. with a good bonding gravel.

The Illinois Highway Commission has been constructing the bituminous macadam by following, with one or two exceptions, exactly the same methods that would be pursued in building a good waterbound macadam road up to a point where the bituminous surface is added. Usually the roads have been made 8 in. thick, 5 in. of which is in the lower course of stone and 3in. in the upper course. The practice of bonding the lower course has been adopted. It is not believed that bituminous macadam can be constructed by the penetration method successfully if the upper layer consists of pieces much less than those ranging in size from 1 in. to 1½ in. If hard materials of this class are used the screenings may be used in the bituminous construction also. The size ranging from ¾ to ½ in. is spread before the first spreading of bituminous compound, the size ranging from ½ to ¼ in., free from dust, being used for the final dressing. If the screenings obtained from the soft limestones are used in the bituminous construction there will be so much dust present even after repeated screenings that the bituminous application will be seriously affected on account of the presence of dust, which will prevent the adhesion and penetration of the binder. It is better practice to use two sizes of screened gravel in the bituminous construction, one size ranging from ¾ to ⅜ in., washed and carefully screened, and a size ranging from ⅜ to ¼ in. The surface of the macadam is treated with an application of about 1 gal. of bituminous compound per square yard of surface, the binder being spread upon the surface of the road with a special pressure spray apparatus designed by the commission. The nozzle is equipped with a steam jet which discharges through the orifice through which the bitumen flows. As a result the binder is blown out in a fine spray and strikes the road surface with considerable force. Great importance is placed upon the necessity for applying the binder under pressure so as to insure its being forced down into the voids in the surface of the road.

After the surface is covered with the binder the macadam is rolled once with the roller wheels wet to prevent sticking. This rolling is simply to replace any stone that may have been disturbed in the course of applying the binder. After this rolling the surface is sprinkled with the ¾ to ½-in. gravel. This second spreading of gravel is again covered with a bituminous compound at the rate of about ½ to ¾ gal. per square yard of surface, and after it is spread the surface is immediately covered lightly with the torpedo gravel and rolled. The surface is then gone over with a third spreading of the bituminous binder. The surface is finally covered with torpedo gravel, rolled and opened to traffic. In the construction of roads in this way a layer of ¼ to ⅜ in. in thickness can be built up on surface of the stone, this layer consisting of bituminous binder and hard pebbles, making a wearing surface which is of a mastic nature, the stone in which is sufficiently hard to withstand a considerable amount of wear without showing appreciable deterioration.

The action of traffic on such a road is to wedge down the gravel pebbles in between the limestone, forming a crust which is very hard and durable, and at the same time is smooth and affords an excellent foothold for horse-drawn vehicles and a very satisfactory surface for the use of automobile traffic. Usually the most satisfactory texture has been obtained in the surface of the road when the bituminous compound used is of such a nature that it "bleeds" or exudes during hot weather.

Close attention, however, must be given to it after the road is opened to traffic, as the bleeding will continue for two or three weeks, or longer, if the weather is hot.

Concrete Slab Type of Construction at Vancouver Island

An unusual system of construction has been adopted for the general buildings at Bamberton Cement Works, Vancouver Island, B.C. These works are being erected by the McAlpine Robertson Construction Company, of Vancouver, B.C., at whose suggestion was adopted the concrete slab system of construction, of which we give a description and photograph. The finished buildings present the appearance of an ordinary reinforced concrete structure, with the exception that the panels between the columns are built of concrete slabs ready moulded for the job. The slabs are 3 in. by 9 in. in cross section, lightly reinforced, and of a length depending on the distance between columns, which may vary from six to twelve feet. The columns are reinforced in the usual way with a steel rod at each corner with suitable ties. The form for one face of a column is made the full height and for the other face short forms of about four feet in length are used, and on these column forms the sides are returned to form the sides of the finished column. The long form is set up first, the column reinforcement is put in position, and the slabs are built up to a convenient height, say four feet, and rest against the return of the column form. The first length of form for the other face of the column is then set in position and the returns on the short forms rest against the slabs and hold them in position. The column is then filled with concrete and the next length built up.. This system of construction has many advantages, the principal ones being the saving in concrete, and the economy in form work. The photograph we reproduce is the sack store at Bamberton Works.

Concrete slab construction at Bamberton Cement Works, Vancouver Island

A Possible Cause of Dusting Floors

Concrete floors sometimes "dust" under wear. The dust is produced by an abrasion of the surface, and when stirred up by traffic, is thrown in the air. A good concrete surface should not dust in this way, and in examining the matter, we must look for causes which may produce an unduly soft surface film, says Concrete-Cement Age. The construction of dustless floors was discussed in the October issue under Consultation Item 206.

Dustless floors have been a matter of much study and experiment. It has seemed to be a fact that dusting invariably appeared to be more serious on work finished in winter where salamanders had been used to keep the temperature above freezing. In an effort to find an explanation of this, it was suggested that the presence of salamanders produces a concentration of carbon dioxide in the air. This is a gas, heavier than air, and spreads out over the floor. Being acidic in its nature, carbon dioxide reacts with the calcium hydrate liberated in the process of solution of the cement, and forms calcium carbonate on the surface. This compound is chemically analagous to our regular limestone, but the physical conditions surrounding its formation, in such a case, result in a product that is soft and affords no great resistance to abrasion, with the result that a floor shows a very serious tendency to dust.

With the coming of winter, salamanders will be used to keep construction work above freezing; and constructing engineers will do well to keep in mind the possibility that salamanders may affect the surface finish.

New Departmental Store for Montreal

THE Peter Lyall & Sons' Construction Co., Limited, have just commenced work on a new departmental store for W. H. Scroggie, Limited, Montreal, from plans by Mr. D. J. Spence, Montreal. The site is one of the finest in the city, the block being bounded by St. Catherine street west, Bleury street, St. Alexander street, and Edward street. The contract calls for the completion of the building in September of next year. The old property, which is now demolished, was acquired by the Belgo-Canadian Realty Company, who are finding the capital for the new structure. The building will consist of six storeys, basement and sub-basement, with provision for two additional storeys. The frame will be of steel, and the exterior will be of buff brick and terra cotta, the cornices being of copper.

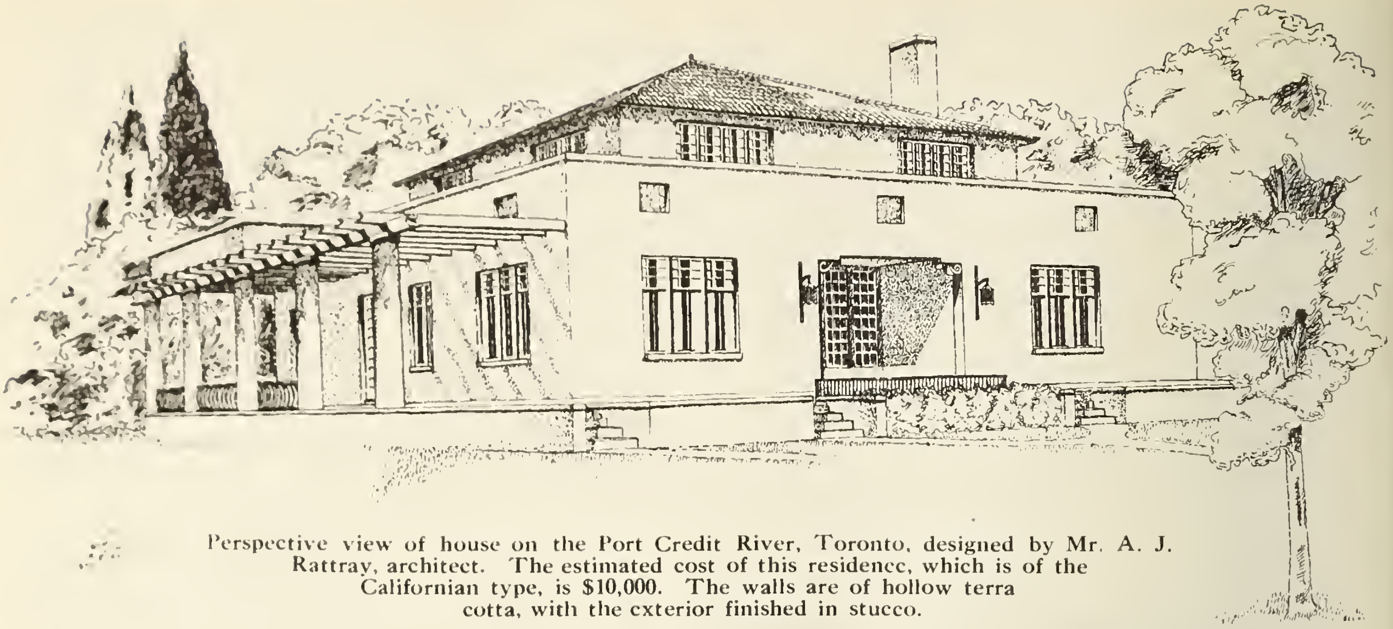
Each floor, which will be of concrete, will have an area of 38000 square feet, a sprinkler system being installed. The lavatories and corridors will be of tile and mosaic, while the stairways will be of iron and marble. The principal entrances, two in number, will be on St. Catherine street, but there will also be entrances on Bleury and Alexander streets. Shipping will be done from the Edward street entrances, and in this connection hydraulic hoists will be fitted up. Six electric passenger elevators are also to be installed. A feature of the store will be a roof garden, which it is proposed to fit up and lease for high class vaudeville in the summer; in the basement arrangements are to be made for a rathskeller.

The sub-basement will be utilized for the power plant, vacuum cleaners, ventilating apparatus, &c., and for storage purposes. There is to be a low pressure steam heating system, and a direct system of electric lighting.

With the object of ascertaining the practicability of delivering cement in bulk, the Universal Portland Cement Company have recently consigned a truck load of cement without packing of any kind. The truck was first lined with waterproof paper, and the cement was loaded from wheelbarrows. It is stated that the truck arrived at its destination with absolutely no signs of loss or leakage, and that the cement was lying smooth and undisturbed, apparently in the same condition as when it left the works. For employment on contracts where the material can be transported direct from the manufactory to the site, customary methods of packing cement in bags appear to represent useless outlay.

Speaking of the cement industry in British Columbia our Detroit contemporary, "Concrete-Cement Age," says: "The best cement and that purchased in largest quantities is from the United States." The observation is suggestive.

Proposed new Departmental Store for W. H. Scroggie, Limited, Montreal



Perspective view of house on the Port Credit River, Toronto, designed by Mr. A. J. Rattray, architect. The estimated cost of this residence, which is of the Californian type, is $10,000. The walls are of hollow terra cotta, with the exterior finished in stucco.

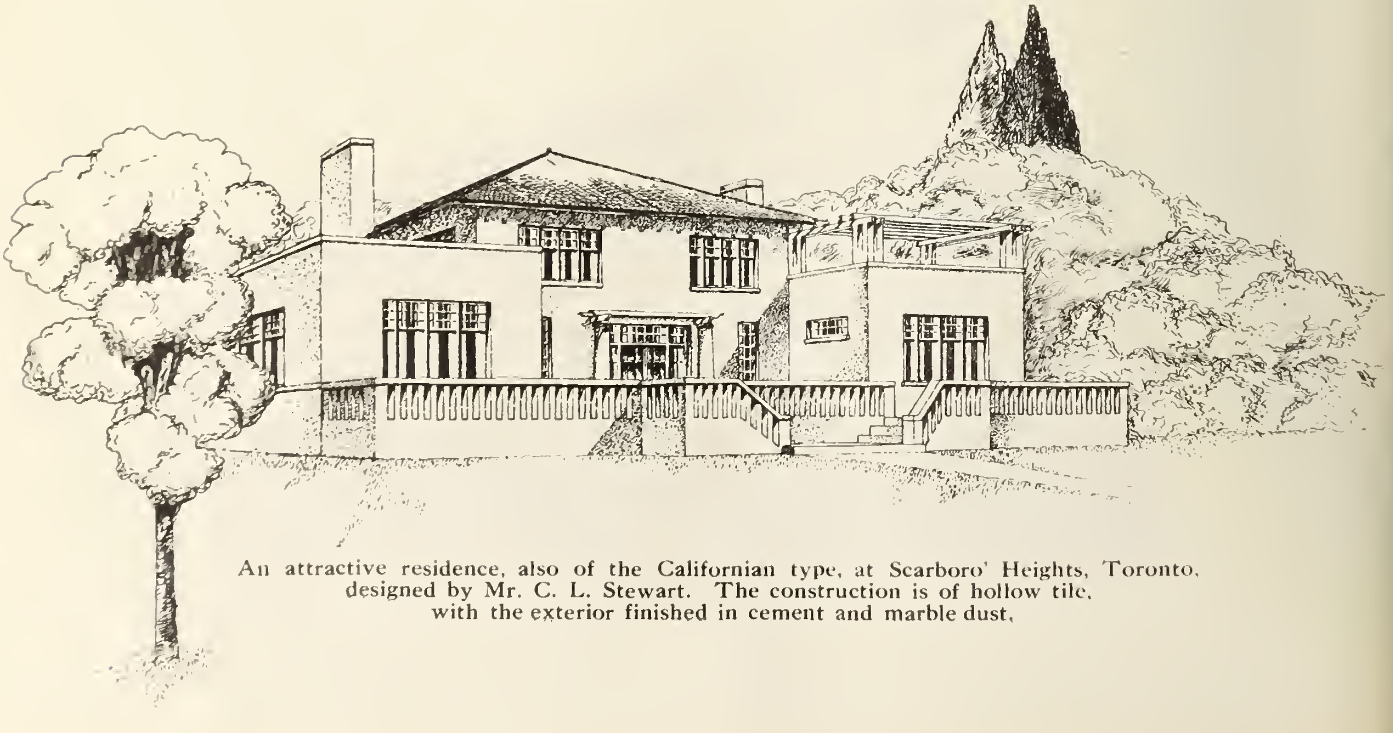
Attractive Residences of the Bungalow Type

We reproduce herewith designs for two residences of the Californian type—one on the Credit River, designed by Mr. A. J. Rattray, and the other at Scarboro' Heights, designed by Mr. C. L. Stewart.

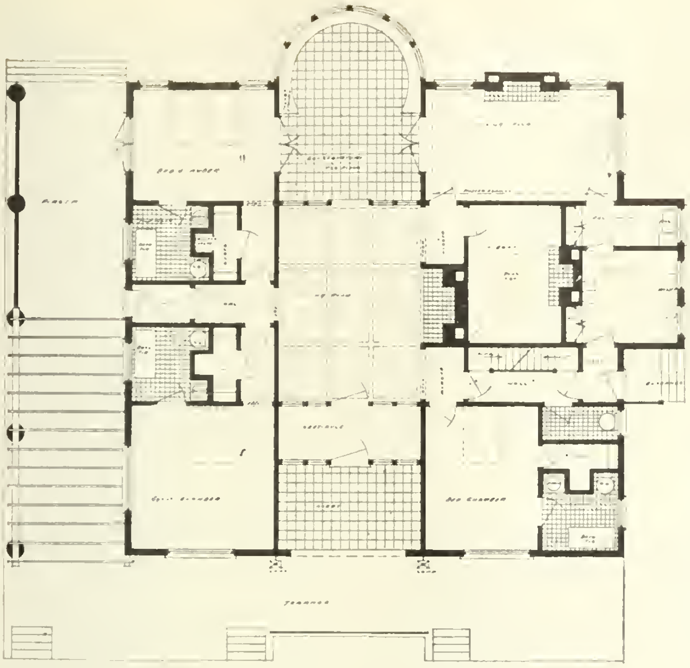
In the first named residence—that of Mr. Rattray's design—the walls are of hollow terra cotta, while the exterior will be finished in stucco, the structure resting on a concrete foundation. The woodwork entering into the residence is quarter-cut white oak. The house stands on a splendid site of about eight acres, the accessory conveniences including a boat house, garage, septic tanks, gas plant, etc. A feature of the accommodation of the house is that each bedroom has a separate bathroom, with tiled walls and floors. On the first floor there is the billiard room, where all the rafters are exposed and stained. On this floor also are two maids' rooms and a children's play room. The estimated cost of the residence alone is $10,000.

Residence at Scarboro' Heights

The general features of this residence, such as terraces, pergolas, etc., belong particularly to the Californian type. The construction is of hollow tile covered on the exterior with cement and marble dust, giving a pure white finish, which in the sunlight brings out a sharp contrast. The roof is of Spanish tile. The interior of the ground floor is arranged around the reception hall, giving easy access to every portion of the house. The hall itself, which is finished in fumed oak, is worthy of note. The spacious living room, in walnut, is beamed and panelled. The reception room



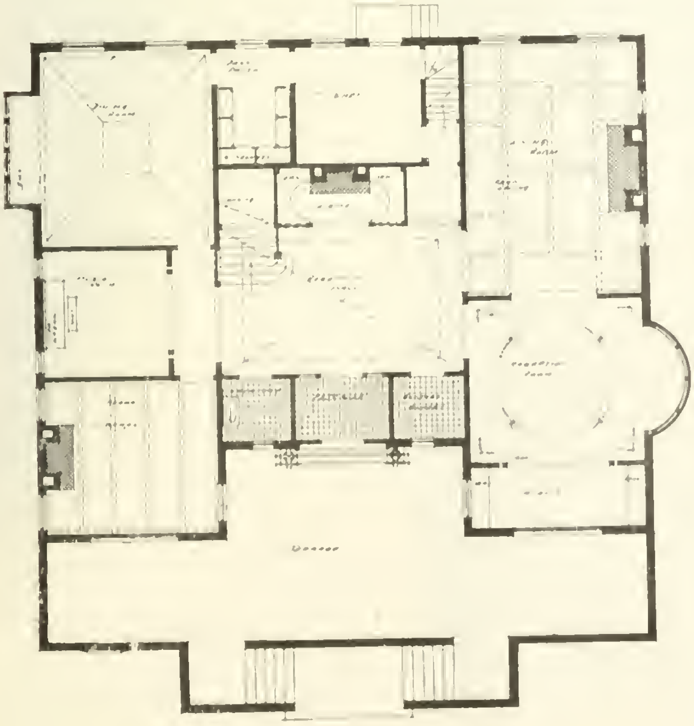
An attractive residence, also of the Californian type, at Scarboro' Heights, Toronto, designed by Mr. C. L. Stewart. The construction is of hollow tile, with the exterior finished in cement and marble dust,



Floor plan, Port Credit River residence

is French grey with gold trimmings. The library and dining room are finished in mahogany and quartered oak respectively. The bedrooms, which are equipped with private baths, are all finished in white enamel, with mahogany doors.

In a bill of the Montreal Polytechnic School, which is affiliated with Laval University, it was sought to get permission from the Quebec Legislature for students to practise as architects without passing the examination of the Architects' Association of the Province of Quebec. A deputation from the association represented to the Legislation Committee that this would discriminate in favor of students of Laval, and the bill was amended by making the examining board consist of two representatives of the association and two of Laval.



Floor plan, Scarboro' Heights residence

Provision of Moulds for Reinforced Concrete

The number of sets of forms to make up for any building varies with the speed of construction required, weather conditions, and shape of building, says Cement Age. On an average 1½ sets of forms is a fair allowance. With this number, erection on the floor above can begin while the concrete below is green, so that in good weather a storey can be built in a week or ten days.

Some large building contractors have adopted the use of only one set of forms in a building, whether it be 2 storeys or 10 storeys high, with additional lumber for girder bottoms and supports that must be left in.

A building of large floor area may be built in sections, setting up, say, one-half of a floor area at a time, so that forms for only about three-fourths of one floor are needed, if the building is small in area and high, two sets of forms may be needed in order to go fast enough.

A long span beam or slab must be supported, in general, a longer time than a short one, chiefly because of the larger dead load. If the dead load, i.e., the weight of the concrete, is heavy in comparison with the live load, i.e., the load which the floor must bear later on, forms must be left a longer time, because the compression in the concrete is large even before the live load comes upon it.

Oxy-acetylene welding of high-pressure gas mains has been accomplished in laying a 6-in. line in San Francisco, Cal. The pipe was welded in sections about 500 ft. long, the welding being done at several points at once. To insure against the possibility of the weld not extending through the entire thickness of the pipe, the ends of the lengths to be welded were left about ⅛ in. apart and the operator worked with a rod of 3/16 in. Norway iron in his left hand. This iron is melted into the joint to take care of the gap and also to build up the metal around the joint. It has been reported that joints thus made proved to be stronger than the pipe itself.

In a recent paper on concrete bridge design, Daniel B. Luten, Indianapolis, Ind., states that the ideal highway bridge must include among its qualifications the following: (1) permanence, eliminating repairs; (2) artistic appearance to harmonize with its surroundings; (3) strength increasing with time and traffic; (4) safety, meaning not merely security, but slow failure in case of defects; (5) stable on insufficient foundations and under extreme flood conditions; (6) effective waterway providing maximum discharge; (7) efficient and economical in use of materials; (8) employing home labor and materials; (9) providing a roadway continuous over bridge and approaches; (10) easily widened to provide for increasing traffic; (11) easily modified in design to conform to improvement in surroundings; (12) simplicity in design and erection.

The statistics, recently issued by the United States Geological Survey, show that over ten billion brick were produced in the United States in 1911.

The Development of Tile Manufacture

Historical Sketch of the Growth of One of the World's Oldest Industries—Valuable Commodity Adapted to Variety of Uses

It is somewhat remarkable that what is probably the oldest industry in the world, aside from agriculture, should be the most recent in our own country—that is among those for the production of staple and widely-used commodities. Now, however, the little square, oblong or hexagonal tesserae which compose the pavement over which we walk every day in our public buildings, or which line the walls of our bath-rooms, or cover our hearths, are made as well, and in as great abundance here as elsewhere.

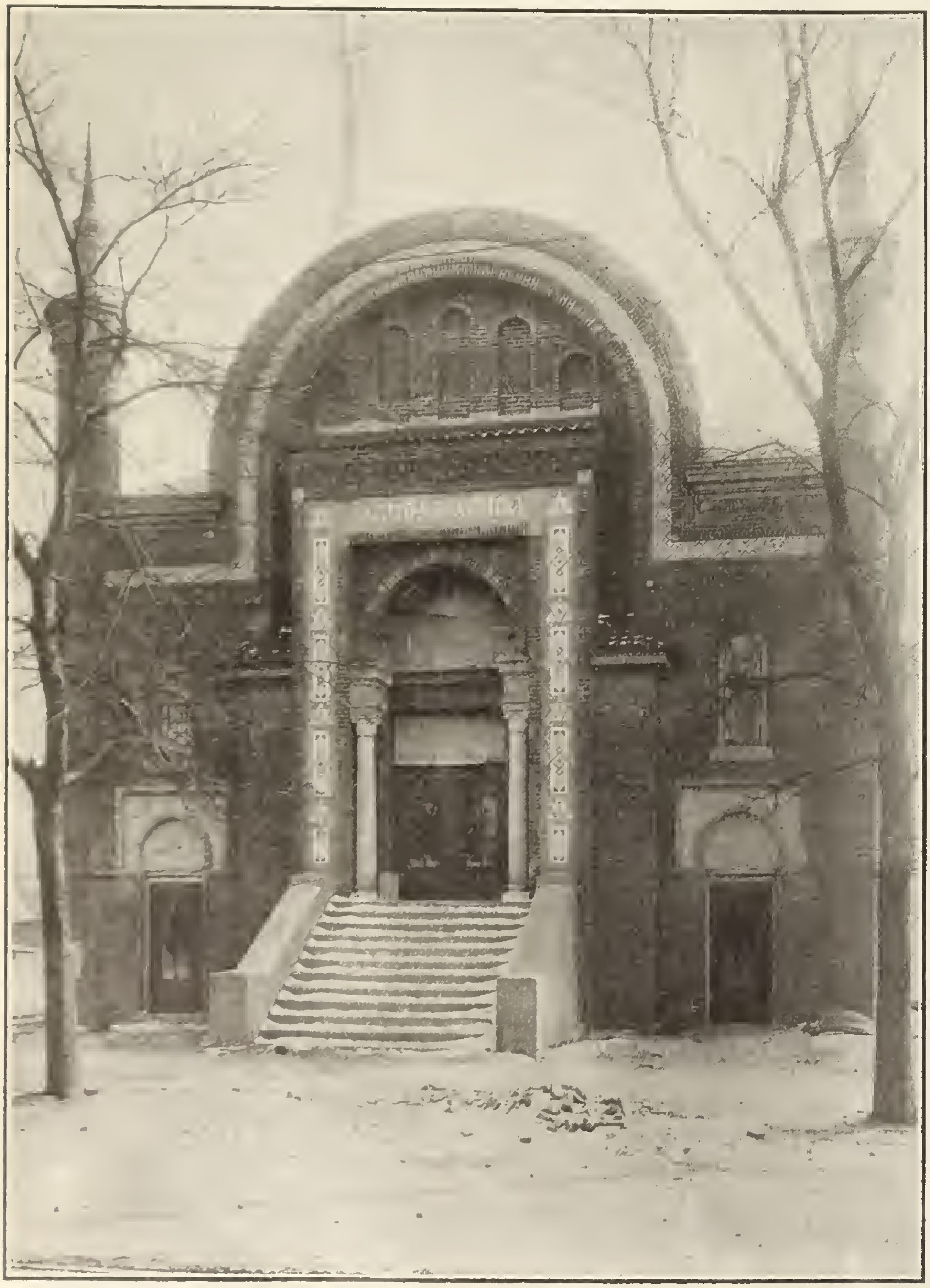
A history of tile would be a history of the world. As old as the delta of the Nile where the art of pottery was ascribed to Num, the oldest of created beings, it has come down through the centuries with hardly a break in its continuity until comparatively modern times.

Interesting mention of a colored pavement is made in the bible story of the feast given by the King Ahasuerus, otherwise known as the Greek Xerxes, at Susa in 521 B.C., the feast at which the rebellious Queen Vashti refused to appear. The pavement, which was in the court of the palace garden, is described as consisting of "red and blue, and white and black, marble." It is the opinion of one writer that the white and black were marble, but that the red and blue were enameled tiles, as the art of enameling in glazed colors was well understood at that period and especially in that locality.

All Mohammedan nations have excelled in tile making. No more beautiful have ever been seen than the glazed tiles which the Persians used to incrust their floors and walls, especially in and around Teheran where there is a dearth of marble. The interior of Persian baths are very often completely lined with them, and they are also found on outside places, such as domes of mosques, minerets, city gates, etc. The Moores have left the most superb example of painted and enamelled tiling in the world, in the Alhambra and other buildings at Cordova and Toledo, which stand as monuments of their occupation in Spain.

The art spread to Europe about the twelfth century when the crusaders brought home from eastern lands glazed tiles and most likely a knowledge of their manufacture. The highly decorative pavements of the middle ages which may still be seen in old European cathedrals retain their original lustre and vivid colorings, although most of this work has, of course, gone the way of other details of architectural ornament.

Nowhere did the industry flourish as in England. Old kilns discovered in various parts testify that the religious orders engaged in it there very



Exterior Jewish Temple, Peoria, Ill. Name, panels and border made of unglazed art mosaic, set in recess left in brick work.

early, continuing the pursuit until the sixteenth and in some districts, even until the eighteenth centuries. There was great variety of design. Conventional flowers, animals, heraldic devices, texts, mottoes, single figures, and composite pictures may still be seen in some of the old abbeys.

Tile of modern make for covering floor or walls is generally described as Encaustic, a term which simply means "burned in," the various public spellings of which one manufacturer declared would line the walls of his office. Originally it was used only of tile having a top layer or pattern of different colored clays burned a slight depth into the main body, but it is now applied more indiscriminately to those of solid color as well. Encaustic tile is really a revival of the old glazed tile of ancient times, the manufacture of which lay dormant for so many generations before about the middle of the nineteenth century.

Modern tile making had its origin in the famous Minton factory at Stoke upon Trent, England, where Herbert Minton, who succeeded his father, Thomas Minton, in the glazed pottery business in 1836, set out with the determination to manufacture encaustic tiles which should meet public favor "if each one cost him a guinea." So well did he succeed after much research, experiment and failure, that the achievement became the crowning glory of his life. He had solved the problem of firing various clays so as to secure uniformity of color and of shrinkage, and also extended the range of colors used by potters of the middle ages. In 1846 the encaustic tile business was firmly established for all time, and Minton tiles are now known and used the world over.

Tile making on this continent had its inspiration in the displays of the Centennial Exposition held at Philadelphia in 1876, just thirty years after its renaissance in England. Two brothers, J. C. S., and Alfred Harrison, became so imbued with its possibilities that they resolved to start a manufactory of their own. The next year they established the United States Encaustic Tile Works in Indianapolis, Ind., the first of its kind to manufacture all kinds of encaustic tile. In their employ was Mr. Minton Taylor, a nephew of the Mintons in England.

It was at this plant that the famous matt finished tiles now so universally used, were invented several years later by Wm. F. Landers, the present manager. All floor and wall tile before this was glazed. Here also may be seen the great "jumbo" kiln, the largest in the United States, and possibly in the world. This kiln will hold four thousand "saggers" at a time, a "sagger" being the oblong open clay vessel about one foot deep, one wide and two long, in which the tiles are placed to be fired.

Clay, combined with flint, spar, and other vitrifiable materials is the basis of all tiles. Every factory has its own formulae and derives its clay from all parts of the world. Some of the best comes from Cornwall, England. It is made ready for use by alternate grindings and filtrations.

Tile is made by exactly the same process as brick and terra cotta, and it would be hard to define the difference between them, each one being a different form of the same thing, merely a cake of vitreous clay, molded into shape, and baked to hardness by intense heat. The ancients could have employed no

Altar, Jewish Temple, Peoria, Ill. Finish above altar in glazed art mosaic other method, only they probably pressed their pieces by hand, and baked them in the sun.

What most impresses a visitor upon going through a tile factory for the first time are the simplicity of the process, the clean whiteness of everything, as in a flouring mill, and the fascination of watching the rows of little tile pieces with their exact edges, come out of the steel dies into which they have, an instant before, been sprinkled in the form of damp powder. Tile before being burned is called "green," but even in this condition it is smooth and quite solid.

A glimpse into one of the big beehive shaped kilns, while not in use, is also very interesting. All around the wall light and dark streaks show where the fire pots alternate with the saggers piled one above the other almost to the very top. After the fires are laid, they are stoked, of course, from the outside. Here for many days, the tiles are subjected to a heat of from two to three thousand degrees. They become vitrified in the process, harder than marble, impervious to moisture, and almost unbreakable.

Tile floors and walls are "laid" nowadays before they are shipped. Segments are formed by pasting the different colored tiles, composing the design face downward upon the paper. This is called mounting. When these segments reach their destination they are placed into position, the paper is washed off, and the cement is rubbed into the cracks.

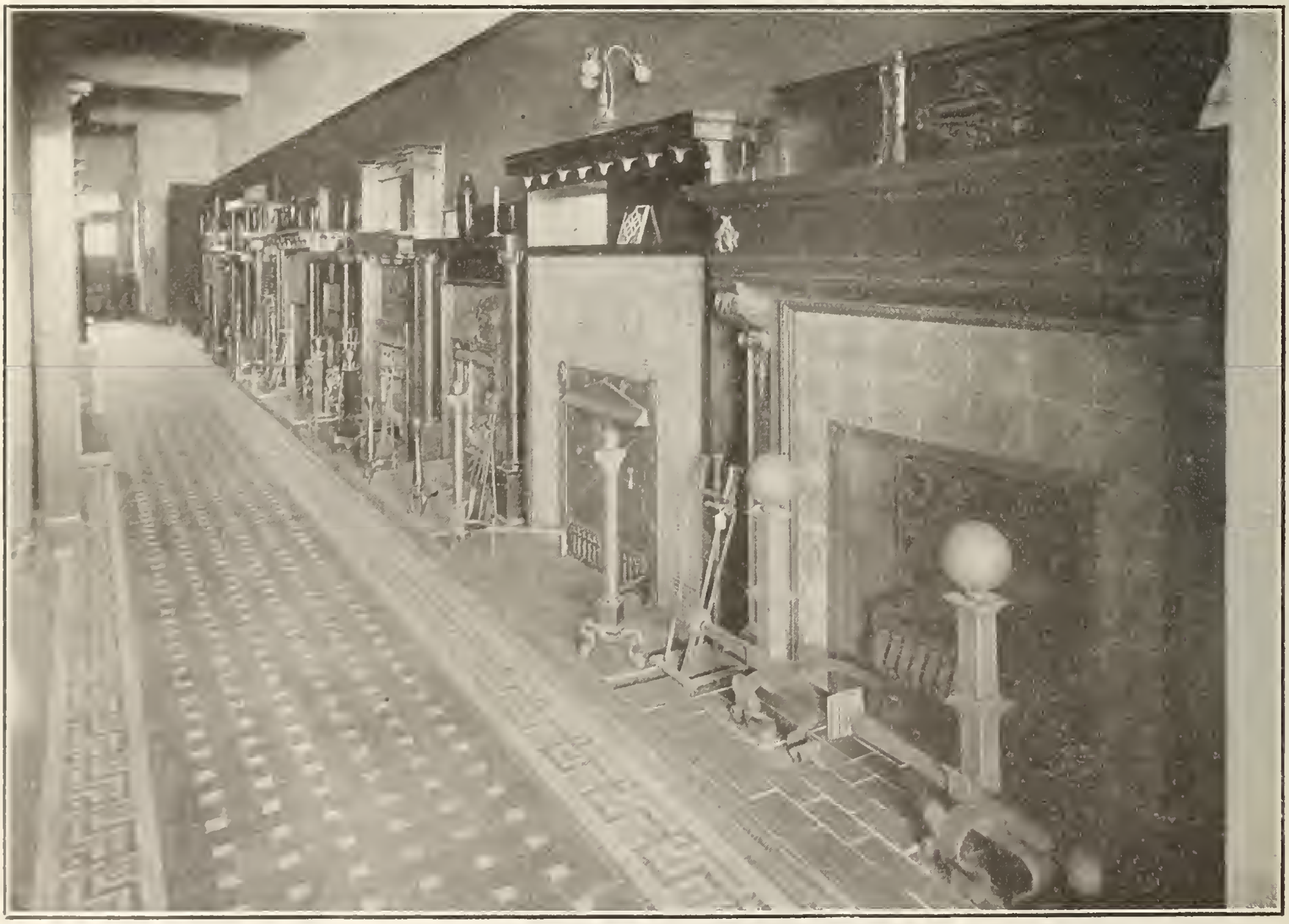
Tile is coming to serve a greater and greater variety of purposes. Some of its latest uses are to line refrigerators, cover the tops of scales, and conceal our modern unsightly radiators.

Good examples of beautiful tiling used in our own country are numerous. A recent technical magazine describes a small hallway occupied by the late Stanford White, in New York city. Its walls were lined with Oriental tiles in white, blue, yellow. Light was received from a large window, upon which were hung panels of painted glass of antique beauty; an old wall-fountain filled the greater part of one side and a stairway was fitted with fragments of old marble for a balustrade.

"The effect of all this soft, rich coloring," continues the article, "in the glow of medieval glass and with the air freshened by the water flowing from the fountain, which was surrounded by flowering plants, made an interior setting ever to be remembered."

Countless instances of buildings lately constructed show that tiles are being used, as in ancient times, for exterior as well as interior decorations. One of the best examples is the facade of a small commercial building in East 44th street, N.Y.C., "where," says this same periodical, "the highly ornate 'Venetian Gothic' exterior is achieved largely by a judicious use of tiling, either embedded in cement, or used as part of the actual walls."

In the case of U. Marcotte versus the Montreal Concrete Company, the plaintiff, at Montreal, claimed $2500 damages, on the ground that certain cement blocks supplied him had crumbled badly after being placed in the wall of a building. Mr. Justice Demers decided that a builder or contractor must examine all materials on delivery, and discover any defects that may exist. He therefore gave judgment for defendant, and also admitted a claim of the company for payment of the balance due on the account.



Interior view, show room of Peoria Stone and Marble Works, Peoria, Ill.

Building Operations at Calgary

Good Progress on Larger Work — C. P. R. Building Practically Enclosed

(Correspondence of the Contract Record)

Calgary, Alberta, December 19, 1912.

MILD weather has prevailed in this city, in consequence of which all buildings have progressed more rapidly than would otherwise have been possible. Contractors have covered in some of the larger buildings with canvas, so that work may be carried on throughout the winter, regardless of the temperature.

Building permits for the month of November show that there has been no diminution in the commencement of work. The total was $1,903,900, as against $545,340 for the corresponding month in 1911. The permits for the first eleven months of the year totalled $19,360,660—an increase of more than 58 per cent. over the $12,209,500 for the same period in 1911.

Rapid progress has been made on the new Canadian Pacific Hotel and the building will soon be entirely enclosed. All of the structural steel is on the site, and the erection should be completed before another week. Two thousand seven hundred tons of steel have been supplied by the National Bridge Company, Limited, of Montreal. This hotel will have at first approximately 350 bedrooms, all intercommunicating in suites, and two-thirds with connecting baths. The construction is a steel frame, fireproofed by concrete, with reinforced concrete floors. The exterior to the third floor is of cut Bedford limestone, furnished by the Kettle River Company, of Minneapolis. Above the third floor the exterior is of buff face brick, backed by common brick. Above the main floor the trim will be entirely of birch, stained to mahogany, with fir floors for the bedrooms, and tiled floors and wainscoting in the baths. Messrs. P. Lyall & Sons Construction Company, Limited, are the general contractors, and Messrs Edw. & W. S. Maxwell, of Montreal, the architects. Mr. Sanford Mapes is local superintendent for the Canadian Pacific Railway.

The contractors for the C. P. R. Hotel also have the contract for the construction of the power house and laundry in connection with the hotel. They have already completed the reinforced concrete tunnel connecting under the tracks, and the radial brick chimney, previously described in this journal, has been completed by the Canadian Kellogg Company, Limited. The power house was designed and the mechanical plant will be installed by the Mechanical Department of the C. P. R. in Winnipeg.

On Saturday afternoon, November 30th, the Mayor of Calgary opened the first unit of the Tregillus Clay Products Company, Limited. This is a purely local organization, employing local capital, and owning many of the valuable deposits of clay shales in and around Calgary. The plant was described in detail in the last issue of the Contract Record

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Yet another plan has been prepared to relieve traffic conditions in Montreal this time by Mr. J. Rawson Gardiner, architect, who has submitted it to the Board of Control. He suggests that a general street plan of the city should be drawn up, together with detail plans of the streets to be widened or expropriated, showing the buildings affected at a scale of 100 feet to an inch with levels and grades. An outside expert could report on any changes which might be desirable, and the homologated lines could be laid out for all streets, not already built up beyond hope of widening. The city might later proceed with the most needed appropriations for widening, upon a plan which would enable them to sell enough property from surplus appropriations to pay, or nearly pay, for the improvements.

New Cold Storage Plant at Edmonton

Messrs. Read-Macdonald-Brewster, Limited, of Edmonton, have practically completed the construction of a large cold storage plant for Messrs. P. Burns & Co., Ltd., of Calgary. The new plant is located on a triangular plot of ground, some 35 acres in extent, in North Edmonton, and will consist of the cold storage building now finished, with a power house, an ice-house having a capacity of 750 tons storage, a stable-barn accommodating 20 animals with feed overhead, a machine shop, outside storage warehouse, fertilizer storage, and the stock yards, 250 feet long by 180 feet wide at present.

The building completed is solid brick, 114 ft. 5 in. by 97 ft. 7 in. outside, with basement and five storeys above, being 82 feet above the foundations. The foundation walls are of concrete, with brick walls of varying thickness above the basement. The interior construction is the ordinary mill construtcion with insulation of floors and walls in certain parts of the building. There is a vestibule along the south end, 15 ft. 6 in. wide, leaving a smoke room at one end. Another brick wall divides the interior into two parts, the north end of one being used for the rendering process. The entire vestibule end is fireproofed, having floors of reinforced concrete.

The floors in this building are 3 in. by 9 in. D. & M. coast fir, laid on 6 in. by 12 in. joists and slushed with 1-ply felt in asphalt, upon which is laid a special packing house brick manufactured by the Garden City Sand Company, of Chicago, who supplied about 175,000 for this building alone. The roof is laid on heavy joists and consists of 2 in. D. & M. fir, then 2-ply paper, 2 in. cork slabs, 2-ply paper, and on top, ⅞ in. D. & M. fir, covered with a 4-ply tar and gravel roofing. The brick wall insulation consists of 3 in. cork against the brickwork, paper, and then 2 in. cork protected with ½ in. cement plaster. Insulated floors are 3 in. D. & M. on joists, slushing, then two layers of 2 in. cork, 2-ply paper, and a 2 in. D. & M. wearing surface. Jones patent cooler domes were used throughout. 1,500,000 common bricks furnished by The Sandstone Brick & Sewerpipe Company, Limited, of Calgary, were used in the construction, together with 3,000 cubic yards of concrete in the foundations.

The boiler house and power plant is a brick walled building, 47 ft. by 12 ft. inside, located 120 feet from the cold storage building. There will be two 212 h.p. (Alberta rating) Babcock & Wilcox boilers, having a steel smokestack with the top 125 feet above the grates. The roof over the boiler room will be a 4-ply tar and gravel roofing on 2 in. D. & M., laid on joints, which are carried across three steel trusses with 51 foot spans, leaving a clearance of 23 ft. The roof over the engine room will be carried on steel trusses with 33-foot spans, and will consist of 2 in D. & M. on 6 in. by 12 in. joists, 2 in. cork covered by ⅞ in D. & M., laid with a 4 ply tar and gravel roofing. The mechanical equipment, in addition to the two boilers, consists of one 1,000 h.p. Knowles feet water heater, two Worthington feed water pumps, two Worthington cold water pumps, and one Fire Underwriters' pump having a capacity of 1,000 gallons a minute. The power equipment will consist of one 150 kw. direct connected Robb engine with generator.

The entire design of the plant was made in Calgary under the supervision of Mr John Burns. Mr Frank G. Carpenter is the company's engineer. The cost will exceed $250,000 for buildings alone

Thermal Effects Upon Brick Pavements

Expansion and Contraction of Cement-Filled Brick Pavements as Revealed by a Series of Strain-Gauge Tests

By James E. Howard, Engineer-Physicist, U. S. Bureau of Standards.

An ideal street pavement is one which presents a smooth surface of such hardness and rigidity that the tractive effort of moving vehicles is reduced to a minimum; having a surface smooth, without slipperiness; of adequate frictional properties for the safe footing of men and animals and against the skidding of motor-driven vehicles; durable against abrasive wear, and of sufficient compression strength or sustaining power against concentrated wheel and toe-calk loads; one in which the physical properties are not materially modified by the usual range of atmospheric temperatures and which is practically nonabsorbent and impervious to moisture. These conditions are generally met in a pavement of vitrified brick of monolithic construction, the continuity of which is attained by means of cement-filled joints. If not confronted with destructive tendencies incident to changes in dimensions caused by changes in temperature there is apparently no reason why a well constructed brick pavement should not maintain a state of integrity and successfully endure traffic conditions for many decades of years.

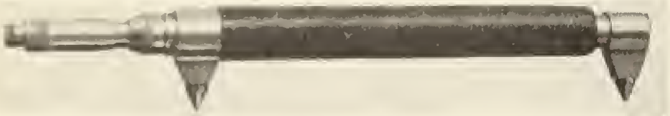

Fig. 1—Strain-gauge used in measuring thermal effects on street pavements.

An inquiry into the effects of changes in temperature on cement-filled brick pavements is an inquiry of a refined order, taking up the subject at an advanced stage, from a constructional point of view, but nevertheless involving questions of vital importance, the solution or adjustments of which will promote the success of this type of pavement and contribute toward securing that permanency which is desired.

Physical Properties of Paving Brick

The crushing strength of vitrified paving brick commonly ranges from 10,000 to 15,000 lb. per sq. in., not infrequently reaching and exceeding 20,000 lb. per sq. in. The compressive modulus of elasticity is found to range ordinarily from 2,500,000 to 8,000,000 lb. per sq. in., with a value as high as 10,000,000 lb. per sq. in. occasionally observed. (In building bricks values below the above mentioned minimum are often displayed.) The compressive strength and modulus of elasticity increase as the weight per cubic foot of the bricks increase, while the porosity or rate of absorption of moisture decreases. That is, the more material there is in a given space the stronger and more rigid it is, and necessarily less porous. These are features which should be considered in a paving brick and they are features which are controllable in the process of manufacture; at least the apparent modulus of elasticity is modified by the conditions of burning the brick, while the crushing strength and density certainly can be controlled within limits.

As regards the value of the coefficient of expansion of brick, data are not as complete as desired. The values frequently seem to be in the vicinity of 0.0000040 per degree F., with some examples, however, approaching the values for steels, or above 0.0000060. A value of 0.0000040 has been accepted for the time being in considering some of the phenomena attached to the expansion of pavements, since this corresponds well with the observations which have been made on the behavior of the pavements.

Expansion Stress

In regard to the relation between modulus of elasticity and coefficient of expansion in respect to the force which the confined material would develop when raised through a range of temperature of 100° F., taking for examples four mud bricks selected from different parts of a downdraft kiln, the following Table I is presented:

TABLE I.—PROPERTIES AND EXPANSIVE FORCE OF FOUR MUD BRICKS

Location in kiln	Modulus of elasticity lb. per sq. in.	Crushing Strength lb. per sq. in.	Weight per cu. ft. lb.	Confined stress for 100° F. rise lb. per. sq. in.
Top	10,000,000	19,170	144.3	4,000
¼ down	7,692,000	15,670	136.4	3,076
2/3 down... ...	5,263,000	10,420	130.6	2,105
Bottom	4,545,000	10,870	125.4	1,818

That is, bricks of these moduli of elesticity would be expected to develop, when confined and strictly prevented from expanding, compressive stresses ranging from 1818 to 4000 lb. per sq. in.

The bearing which these figures have upon the behavior of cement-filled brick pavements is this: The pavements will develop certain compression stresses when the temperature is raised, which stresses will be greater with brick of high crushing strength with high modulus of elasticity in comparison with those of a lower modulus of elasticity. Only a portion of the possible maximum confined stress will be realized, but in any case the relative expansive force exerted should be proportional to the moduli of elasticity and, since the highest values pertain to the strongest brick, those pavements constructed of the strongest material will be capable of exerting the highest stresses which are incident to rise of temperature. It would, in some cases, relieve the magnitude and severity of thermal effects to restrict the brick to a grade sufficient to provide adequate

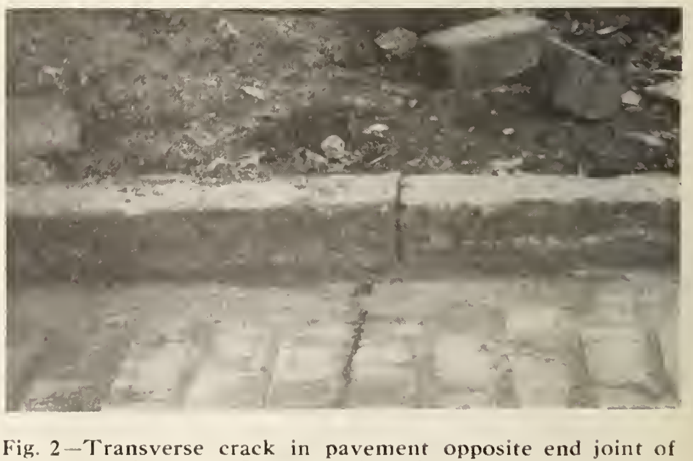

Fig. 2—Transverse crack in pavement opposite end joint of curbstones. Location of crack attributed to contraction of edgestones.

abrasive resistance for traffic conditions of a particular street. The endurance of brick pavements against abrasive wear has been found from experience to be so great that no trouble is ordinarily apprehended in that direction.

The observed expansion of cement-filled pavements, in a direction crosswise of the roadway, has corresponded closely to a coefficient of expansion of 0.0000040 per degree F. In Table II, however, the computed expansion of roadways of different widths is given for a range of temperature of 100° F. for assumed coefficients both of 0.0000040 and 0.0000060. The table gives the total computed expansion, one-half of which might be taken as occurring at each side of the street.

TABLE II—COMPUTED EXPANSION OF CEMENT-FILLED BRICK PAVEMENTS FOR 100° F. RISE

Width of roadway	Assumed coefficient of expansion	
	0.0000040	0.0000060
4 ft. 8 in.	0.0224 in.	0.0336 in.
14 ft.	0.0672	0.1008
25 ft.	0.1200	0.1800
30 ft.	0.1440	0.2160
40 ft.	0.1920	0.2880
50 ft.	0.2400	0.3600

Although the maximum stresses which the confined material could display would range in round numbers from 25,000 to 50,000 lb. per individual brick, yet the street curbing could not ordinarily afford any such reaction. Curbing which is backed up by earth filling yields to moderate pressures when they are long sustained, and in a crosswise direction pavements would not be expected to develop forces of very great magnitude in the absence of substantial buttresses. The fact that the middle of a roadway rises during the period when the bricks reach a high summer temperature is occasioned and facilitated by the crowning of the roadway. The usual pavement is, in transverse section, a bent column of very slender proportions, which easily deflects, increasing the crowning of the arch; this action may result in the formation of longitudinal cracks.

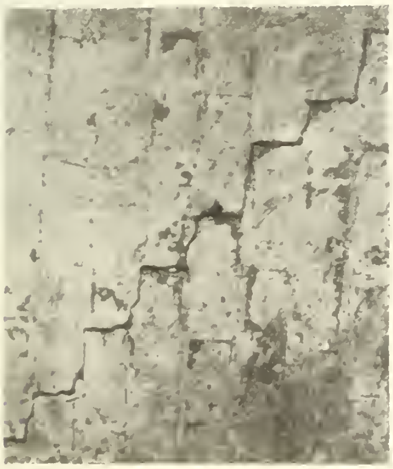

Fig. 3—Zigzag crack in driveway leading from cement-filled section of pavement.

Measurements of Thermal Effects

Observations have been made on pavements in Cleveland, Ohio, and vicinity, covering a period of over a year. They embraced measurements of changes in length both lengthwise and crosswise the roadways. Reference lengths of 20 in. each were established and defined by means of small bronze plugs inserted in the pavement. The tops of the plugs were about 3/8 in. below the surface of the pavement, and were protected against traffic by paper washers and putty. These plugs had in their upper ends small drilled and conically reamed holes, from center to center of which measurements were made.

A strain-gage of the style shown by Fig. 1 was used for measuring purposes. Generally the readings of the gages checked to one ten-thousandth inch, although that degree of accuracy will not be claimed for the work; it is believed, however, that changes in the reference lengths were measured reliable within two ten-thousandths inch. A steel reference bar is used in connection with the strain-gage.

Measurement of Load Effects

In addition to the measurements with the strain-gage on changes in dimensions due to changes in temperatures, the work at Cleveland included a number of observations on the elastic depression of loaded pavements and the depression of trolley tracks under the weights of cars, by means of a levelling-beam. One end of the beam rested upon the track, the other end, 4 or 7 ft. away, upon the pavement; the beam is provided with a sensitive level and a micrometer elevating screw.

There is a general depression of the pavement and roadbed in the vicinity of a car, but slight in amount when compared with the depression of ordinary trolley track. Depression of trolley track usually takes place to such an extent as to make it undesirable to bond the pavement to the track. When a very sensitive level bubble was used the depression of the pavement could be detected some 10 ft. from a trolley car in the direction of the curbstone; this was found on a tar-filled pavement. At an intersection the approach of a man when 12 feet distant was indicated by this sensitive level.

Monolithic brick pavements are very elastic. They depress locally under loads and spring back when released.

Early Cracks in Brick Pavements

In conjunction with the measurements of changes in the 20-in. reference lengths there were observations on the incipient formation of transverse cracks in freshly grouted pavements. The first 24 to 48 hours after grouting is a critical period in the laying of a cement-filled pavement. The grout during the first few hours after applying has very little strength and, like cement structures in general, it cannot safely be disturbed during the period of setting. A drop in temperature of the brickwork of 30° from day to night is not uncommon. An uncovered pavement can hardly endure this drop in temperature without starting incipient cracks. A thin layer of sand on the pavement aids somewhat against the joints being put into a state of tension by the lower temperature of the night. It is probably quite impracticable to use a sufficiently deep layer of sand to entirely protect the pavement against this drop in temperature, while the grout is acquiring strength.

Incipient cracks appear at first as fine dark lines, darkened apparently by the presence of moisture. Later the lines are white, caused probably by the lime in the cement of the grout going into solution and then being converted into the carbonate. These phases have been observed, although they may not be conspicuous in all cases. It is safe to say that thermal cracks must be recognized as a probability and their presence expected, and that they may have their origin in point of time prior to the opening of the street to traffic.

Fig. 2 shows a transverse crack in a pavement opposite the end joint of the curbstones, photographed before the street was opened to traffic. The street did not have an expansion joint, hence there was at least considerable frictional resistance between the pavement and the curbstones. The diurnal expansion and contraction of the curbstones would affect the width of the joint between them. In the case illustrated the brick followed the movements of the curbstones and a transverse joint in the pavement was de-

[illegible] While this street did not have expansion joints at the curb it will not be understood that streets with expansion joints are exempt from transverse cracks due to early changes in temperature. Observations tend to prove that such cracks are of common occurrence.

Growth of Early Cracks

There seems a progressive development in these early transverse cracks, which first appear as fine hairlines and eventually have a measurable width. The presence of a number of such transverse cracks (and commonly quite a number are formed) leads to a lengthening of the pavement as a whole. The pavement of Andrews avenue, Cleveland, in ten months' time had extended in one direction and crowded over the marginal curb at the crossing of the tracks of the N. Y. C. & St. L. R.R. about ⅝ in., and in the other direction had crowded the asphalt pavement of Clifton Boulevard, carrying with it and deflecting the trolley tracks.

Some of the transverse thermal cracks which were developed in the pavement of Farmington Road, East Cleveland, were spanned by reference lengths of 20 in. each, and the progress of development observed. This street was paved about the first of August, 1911. Measurements of reference lengths established on the pavement were taken at intervals during the following months of September, October and November. The measurements of one reference length spanning a transverse crack showed that its development took place as follows:

TABLE III—GROWTH OF TRANSVERSE CRACK, FARMINGTON ROAD, EAST CLEVELAND

Date 1911	Measured Width in.
Sept. 22	0.0 (Initial reading)
Sept. 30	0.0080
Oct. 23	0.0170
Nov. 9	0.0250
Nov. 13	0.0377

The temperature of the brick on Sept. 22 was about 90° F., while on Nov. 13th it was 32° F. This is an example of a wide crack. A remeasurement on the following August showed the crack very much reduced in width, the temperature then being 82° F.

In the progressive development of a transverse crack there is a probability of its not closing entirely when the pavement subsequently reaches a maximum temperature. Fine particles of sand or abraded material from the surface of the pavement are likely to get swept into the crack during the daily drop in temperature and prevent the closing of the crack when the pavement again reaches a higher temperature. This process will be repeated until the pavement reaches a state of considerable longitudinal compression.

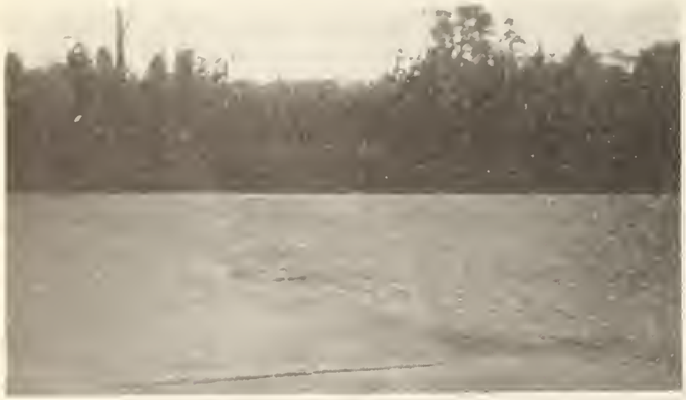

Fig. 4—Creeping of brick pavement, upheaving ridge of asphalt at junction of two pavements and tipping gas main cover.

The middle portion of the length of the street would then remain in a state of more or less initial compression over certain ranges of temperature, while the ends, if unresisted, would extend measurably in each direction longitudinally. The part of the street which is under initial compression longitudinally is for the time being in a firm condition and capable of sustaining traffic satisfactorily.

If the cracks are numerous and near together, and not under sufficient longitudinal compression, the sections then act independently. When depressed by the load of a vehicle an abrasive action will take place between the cracks and tend to enlarge them.

The pavement is believed to be in a favorable condition when under initial longitudinal compression, and the same would be true of lateral compression if the pavement was flat or had very little crowning. Initial compression as such seems advantageous, or a certain amount is advantageous. This state of compression may be reached and maintained along the middle part of a straight roadway, but difficulties are encountered at open ends in providing an adequate marginal curb to resist the thrust.

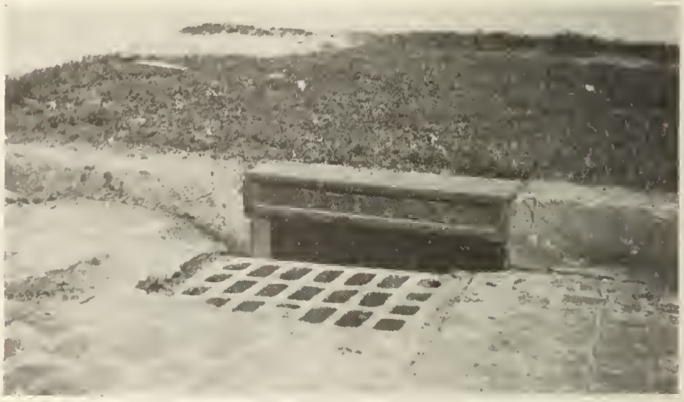

Fig. 5—Catch basin grating sheared by creeping of pavement. Travel of pavement about one brick width

Tar-Filled Adjoining Cement-Filled Pavement

Kennedy avenue, Cleveland, has been paved a year and several months. It is in three sections, of which the upper and lower ones are cement-filled, while an intermediate section has a tar filler. The street has expansion joints at the curbs throughout its length. A noticeable feature in the cement-filled parts of the pavement of Kennedy avenue is its creeping toward the low-resisting tar-filled section.

The lower cement-filled section is travelling upgrade toward the tar-filled section and carrying with it a part of the pavement of a driveway entrance leading off one side of the street. The upper cement-filled section is compressing the intermediate section in a down-grade direction. This compressive force is felt at the ends of the tar-filled section, but not at the middle of its length. Along the center line of the roadway the 20-in. reference lengths in the tar-filled section were shortened 0.1155 in. and 0.1968 in., respectively, for the upper and lower ends of the section, between the dates of Sept. 29, 1911, and Aug. 25, 1912.

The travel of the lower cement-filled section, in an upgrade direction as it chanced to be, carrying with it a portion of the pavement of the driveway entrance is shown by Fig. 3. The portion of the driveway pavement above the zig-zag crack was carried along by the general movement of the surface of the roadway.

Fig. 4 shows the creeping of a brick pavement and its effect upon an abutting asphalt pavement. A ridge in the asphalt was raised and a gas-main cover tipped by the movement of the cement-filled brick pavement. The weaker asphalt pavement readily yields to the pressure exerted by the brick pavement, while the latter itself is more or less cracked in that vicinity as it would be at an open end.

The creeping of a strong brick pavement disturbs manhole frames and carries along with it catchbasin gratings, as shown by Fig. 5. This pavement (Belmore Road, East Cleveland) showed a movement at the place photographed about equal to the width of the brick. One end of Belmore Road abuts against Euclid avenue on which there is a double-track trolley line. The pavement of Euclid avenue offered little resistance against the creeping of this side street, which condition facilitated the shearing of the catchbasin grating.

These illustrations are selected as typical examples, and it will not be necessary to refer to other similar instances. Having in mind the forces generated and their manner of development, it is generally an easy matter to consistently account for the effects of thermal conditions witnessed in pavements, and (where unbalanced forces exist) to predict those movements in the pavement which are realized.

There are places in pavements where only slight changes in dimensions have occurred for a temperature range of 50° or more. There is a compensation in the relief of initial longitudinal compression which occurs during a drop in temperature, and this has nearly or quite compensated for the contraction incident to the lowering of the temperature. The result, observed at a section of Euclid avenue, near University Circle, Cleveland, was the maintenance of substantially a constant or fixed gage-length. Obviously, a section where no movement of the pavement occurs marks a place of great durability. Without the disturbing factor of changes of temperature the construction and maintenance intact of a monolithic pavement would be much simplified.

Measurements or transverse reference lengths are in general more regular and follow changes in temperature more consistently than the changes in the longitudinal reference lengths. It may be remarked in passing that no substantial difference appeared between pavements with and those without expansion joints at the curb, in respect to the display of lateral expansion and contraction. In a longitudinal direction, occasional cracks across the roadway cause some reference lengths (these spanning the cracks) to be longer when the temperature is lowered by reason of the adjacent sections contracting and opening the joints. In few places is there strictly normal behavior witnessed in the longitudinal reference lengths.

Effects at Curves

Figs. 6 and 7 show opposite sides of Carlyon Road, East Cleveland, at the curve in the roadway near Superior avenue. At the time it was photographed, this part of the street was being repaired. At the inside of the curve, as shown by Fig. 6, the pavement had left the cement gutter and was forced over against the opposite gutter, shown by Fig. 7. The open channel between the pavement and the cement gutter at the inside of the bend was 6 in. wide, a considerable part of which, however, represented the result of abrasive wear of vehicles; it was not all due to the bodily movement of the pavement. From 2 in. to 2½ in. represents the maximum movement which has been observed in other streets taking place in a direction away from the inside curb.

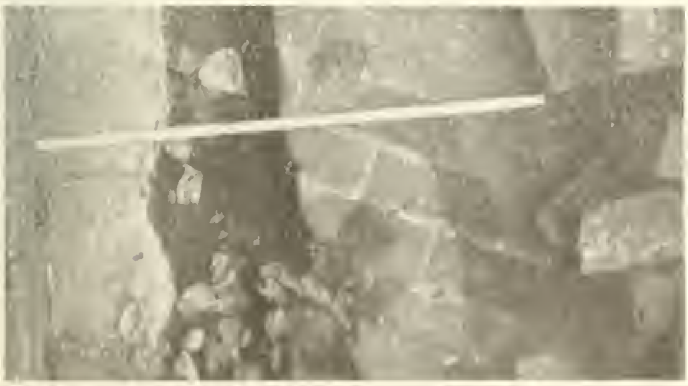

Fig. 6—Channel, 6 inches wide, between pavement and cement gutter. In part due to creep of pavement and in part to abrasive wear by wheels of vehicles.

The pavement of Carlyon Road was under initial strains when the repairs were made. A portion of the pavement was torn up, whereupon the part shown in Fig. 6 gradually moved outward radially an additional distance of ¼ in., first observed, which was subsequently found to have increased to about ½ in. The pressure on the outer curb caused the fractures which are shown in Fig. 7. Sidewalk flagging afforded the necessary reaction to fracture the combined cement gutter and curbing.

In the case of Emily street, East Cleveland, which has a bend near one end of some 50°, the pavement has left the inside curbing for a distance of 160 ft., crowding over against the outer curb. Tension cracks are on the outside of the bent pavement and where the longer tangent of the street has acted upon the shorter one. At the inside curb the maximum opening between the pavement and the curb was found to be 2⅛ in.

Fig. 7—Fractured cement gutter, from thrust of brick pavement.

The conditions in streets with short reverse curves are rather more severe than in single bends. The long tangents set up shearing stresses which fracture the pavement at the reverse curve. Fig. 8 shows such an example on Cummington Road, East Cleveland. The pavement was forced into close contact with the outside curbs of the bends, while at the inside curbs the openings are 1½ in. and 2 in., respectively. At the junction of Abington Road with Cummington Road, near the reverse curve of the photograph there were two openings of 2½ in. each between the pavement and the curbstone. These several openings are believed to have been the result of the gradual lengthening of the pavements by alternate expansion and contraction. When cold, gritty material would fall into open cracks and prevent them closing subsequently when the pavement was next heated, this process being repeated. It doubtless ensures a pronounced lengthening of the entire surface.

Some of the foregoing examples were taken from streets which have been paved for a term of years. The effects

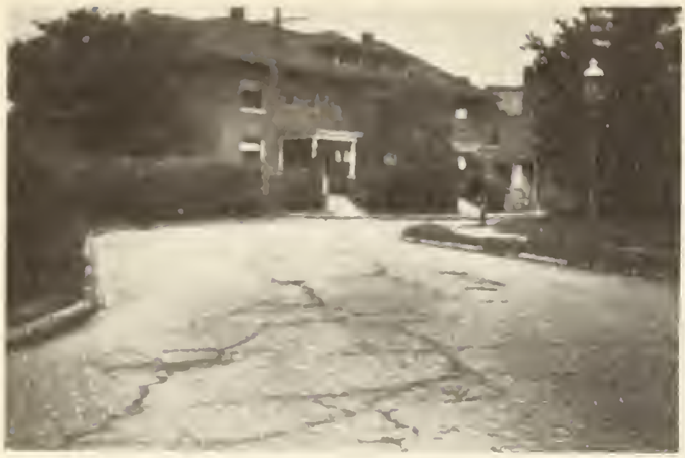

Fig. 8—Shearing fractures in pavement at reversed curve in roadway.

of changes in temperature are cumulative in part, and it would require several years to elapse before certain effects reach a maximum stage of development. Predictions based upon the relations existing between the coefficients of expansion, the moduli of elasticity, and the crushing strengths of the bricks lead to the inference that when thermal effects are considered the behavior of these earlier paved streets may be taken as examples of what should eventually be found in current construction.

Greater strength may reside in recently constructed pavements, but it may also follow that greater internal strains may be introduced by reason of the higher physical properties of the materials used. Internal generated forces depend for their magnitude upon the physical properties of the materials themselves. It is believed that thermal effects will be similarly displayed in pavements both of medium and of maximum strength.

Some additional illustrations are presented on features connected with the general subject of brick pavements.

Longitudinal Cracks at Trolley Tracks

Fig. 9 shows a crack parallel to one of the rails of a trolley track at University Circle, Cleveland. Cracks of this kind are caused by the depression of the trolley track carrying down the pavement which is bonded to or in contact with it. Only track of the highest degree of rigidity can safely be bonded to. It is injudicious to bring cement-filled brick pavements against the rails of trolley track, generally speaking, and yet that may frequently be the most expedient course to adopt. It is not expected that all troubles will be eliminated even though the causes are well understood, and cracks must be looked for in certain places in monolithic pavements.

Fig. 10 shows some longitudinal cracks between the rails and between the tracks, in West 14th street, Cleveland, which are attributed to the transverse or crosswise bending of these paved strips. The expansion of such narrow strips as these would be only a few hundredths of an inch for a range of 100° F., and compression forces due to changes in temperature would not account for the formation of these cracks. These cracks appear to be due to crosswise bending of the pavement. in reaching which result the depression of the tracks and possibly the yielding of the ties on which the track rests are important factors.

Wood-Block Expansion Joints

Fig. 11 shows the appearance of one of a number of single courses of creosoted wood blocks which were used in the pavements of East 32nd street, Cleveland. These courses of wood blocks were introduced at intervals of about 150 ft., and were evidently intended for the purpose of performing the functions of a transverse expansion joint. The bricks adjacent to the creosoted wood blocks were spalled, in a number of places, as shown by the cut.

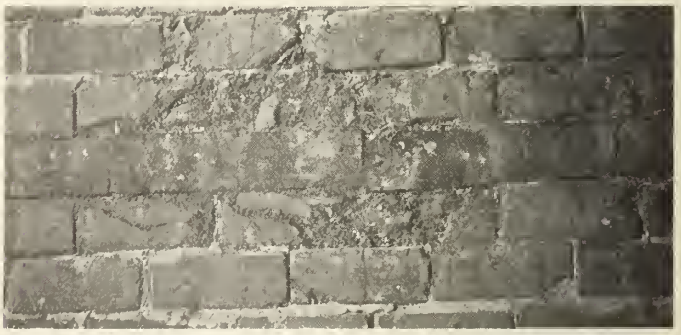

Fig. 11—Spalled course of brick adjacent to course of creosoted wood blocks.

The middle of the length of a straight street is believed to need no expansion joint; as for the ends, they would be benefited by being confined by rigid marginal curbs rather than by the use of joints of a yielding character. This being true, it is a mistaken idea to introduce transverse expansion joints in any part of a street.

Expansion at Sidewalk Crossings

Fig 12 illustrates an upheaval of a sidewalk crossing on Ravine Ave., Cleveland. It is quite unlikely that such a

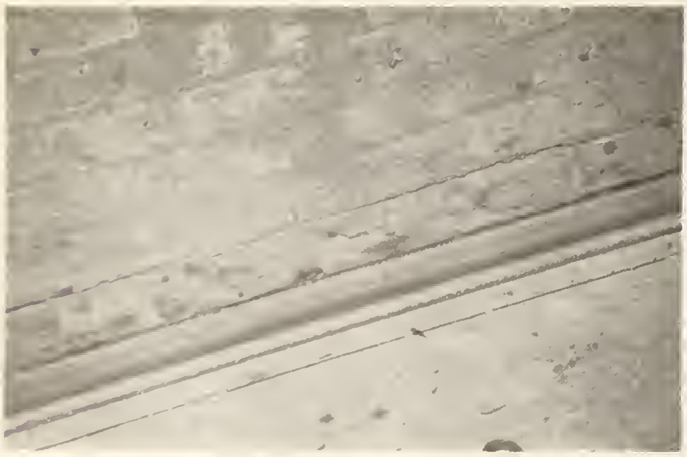

Fig. 9—Crack in pavement, parallel to trolley track, attributed to depression of track carrying down pavement.

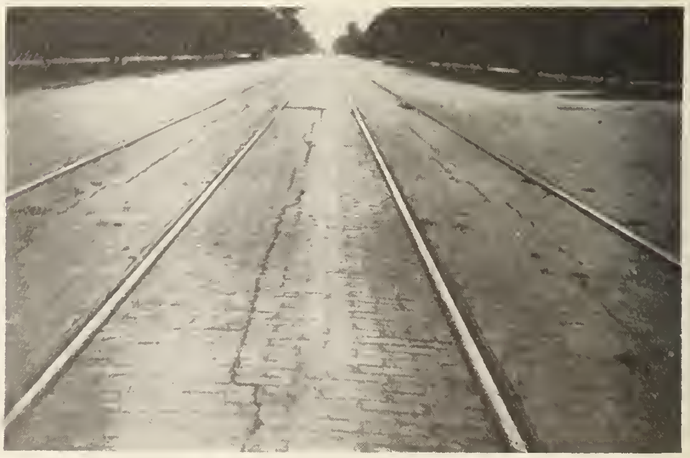

Fig. 10—Longitudinal cracks between rails and trolley tracks, attributed to transverse bending of these paved strips.

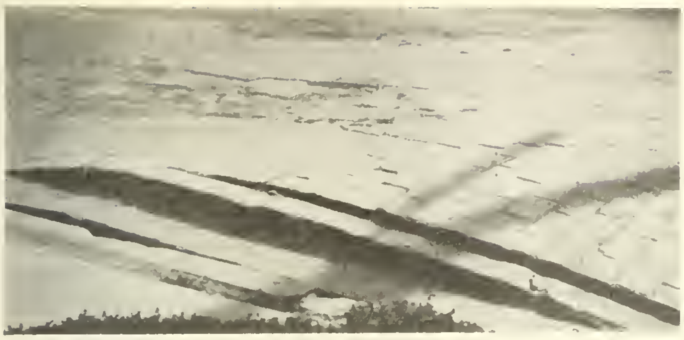

Fig. 12—Upheaval at sidewalk crossing.

detail will again be used since the disrupting effect of exposure to high summer temperatures on such a feature is well known.

Longitudinal compressive forces are well resisted when the elements of the pavement parallel to its length are straight lines, but the introduction of sidewalk crossings sharply crowned, thus changing the elements to curved ones, makes very weak places, easily upheaved by rise of temperature.

Straight members, not curved ones, are employed in other engineering structures to sustain loads of compression and a street pavement is an engineering structure which is governed by the same laws as other structures which are similarly loaded. If there is a divergence in a pavement from the best form of compression member, that is a flat surface, for drainage, or other purposes, the departure should be a minimum.

Conclusions

In conclusion, it is believed that:

1. The integrity of cement-filled brick pavements can best be maintained by adopting such details of design and construction as will enable the pavements to resist forces of compression which are incident to alternate changes of temperature.

2. Provision to resist such compressive forces should apply to the pavement in both longitudinal and crosswise directions.

3. Initial compression, within limits, is a desirable feature to have in a pavement; it seldom happens that the maximum compressive stresses occasioned by rise of temperature are sufficient to cause injury to the bricks by approach to their crushing strength.

4. The middle parts of the lengths of straight streets are from position best located to maintain the continuity of the pavements intact

5. Open ends of paved streets may be expected to display creeping tendencies.

6. End creeping is a consequence of a permanent lengthening of the pavement, and, while individual bricks of the pavement will successfully resist compression stresses incident to rise of temperature, still the total force thus generated is too great to admit of being entirely resisted by marginal curbs or other means available

7. Streets having others enter from one side only are unfavorably situated in respect to being exposed to overstraining forces.

8. Curved roadways have a tendency to leave the inside curbing and crowd against the outside.

9. Continuous pavements will not be expected to remain intact at short reversed curves in roadways, at least in the case of streets having long tangent ends.

10. To successfully resist the compressive stresses caused by variations in temperature, pavements should be laid as nearly flat as feasible, i.e., with minimum permissible crowning.

11. Compression stresses in pavements in directions in which the elements are straight lines are advantageous rather than detrimental and assist in keeping the pavements intact. Conversely, compression stresses acting in directions in which the elements are curved are menacing to the integrity of the pavements. The compressive stresses referred to are those caused by thermal changes, which act in the plane of the pavement, and do not refer to loads or stresses normal to the surface of pavements, such as wheel pressures of loaded vehicles.

Principles of the Imhoff Tank

By Henry N. Ogden, Cornell University

The Imhoff tank is said to throw down 95 per cent. of the "capable-of-settling" suspended solids, and the advocates of the tank explain that the term "capable-of-settling" refers to that proportion of suspended matters in the sewage which will settle out in a measuring glass when allowed to stand quiescent for 2 hours. If Mr. Fuller's estimate of the amount of colloidal matter in sewage not capable of settling is 30 per cent., then the remainder, 70 per cent., is that which remains as precipitable after the use of chemicals; and if the Imhoff tank will throw down 95 per cent. of this it means that, of the total suspended solids, it will remove 66.5 per cent. This should be compared with the 50 to 55 per cent. which is obtained from strictly domestic sewage, and it is probably correct to say that the increased efficiency of the Imhoff tank due to the separation of the rising gas increases the deposit of solids from 10 to 15 per cent.

The second principle of the Imhoff tank is its remarkable performance in taking care of the sludge. Three reasons are assigned for this. In the first place, below the settling tank proper there is provided a large compartment in which the sludge is allowed to remain three to six months, during which time decomposition proceeds and effectively destroys the organic matter so that when finally the sludge is removed it is odorless and much reduced in quantity.

Perhaps no single element has worked more against a greater use of the septic tank than the fact that during the septic process offensive gases are given off. It is to the elimination of these odors that the energies of the inventor of the Imhoff tank were directed, and for disintegration of solids, but he carries on that disintegration without producing odors. His second point, therefore, was that there must be through the sludge compartment no moving or renewed fresh sewage

In septic tanks the liquid sewage and the deposited sludge undergo decomposition together, while in the Imhoff tank all supernatant liquid passes through the tank so rapidly that no septic action is obtained, although in the sludge underneath a very high degree of septicization may be going on. It is said, therefore, that the organic matter in solution, either true or colloidal, is that part of any decomposition that is responsible for offensive gases, and that the deposited solids not subjected to renewed application of fresh sewage do not in their decomposition become offensive This may explain why the Travis tank smells and the Imhoff tank does not.

The third point which seems to be fundamental in the design is that the deposited solids shall be overlaid with 25 to 30 ft. of liquid. Shallow tanks do not seem to be as effective as deep ones and the reason assigned for this is that the gases of decomposition which are produced in the lower strata must, on account of the high pressure, accumulate in greater volume and in their escape produce a greater separation of the sludge particles than in shallow tanks. It is to this action of the gases in the lower layers of the sludge deposit that Dr. Imhoff ascribes the marked porous condition of the sludge which gives it its rapid drying properties after being taken from the tank. The decomposition which goes on at the bottom of the Imhoff tank also gasifies and liquefies a large proportion of the solids originally deposited.

Based on experiments of Dr. Spilner and Mr. Blunk, chemist and engineer respectively for the Emscher Association, the fresh sludge deposited in the lower compartment contains, on an average, 95 per cent. of water. After remaining several weeks or months in the septic chamber it will contain only 75 per cent. of water, and about one-third of the original organic matter will have been either gasified or liquefied. Through these two agencies an original volume of 100 cu. yd. of fresh sludge will be reduced, according to their experiments and figures, to a volume of 16 cu. yd., a shrinkage in volume of about 84 per cent. They assert that through septic tank action only an original 5 cu. yd. of dry sludge matter will be reduced to 3.92 cu. yd., a reduction of 22 per cent. The largest part, therefore, of the reduced volume is gained by the loss in water, this being pressed out on account of the great depth of tank, or indirectly by the greater pressure of entrained gas.

Instead of being compact, non-porous and in texture much like asphalt or rubber, the Imhoff sludge is so porous that the contained water disappears readily, drying out so that it can be spaded in about 5 days and is thereby still further reduced in volume so that its volume is about 40 per cent. less than when emptied from the tank.

Since sewage disposal plants are generally built on the lowest ground where foundation soil is the poorest and where the ground saturation is most complete, it is inevitable that the cost of tanks 30 ft. down will be high. Wisner estimates that Imhoff tank to cost twice that of shallow tanks for the same volume of sewage, although the actual volume of the Imhoff tank is perhaps only one-fourth that of ordinary tanks in volume, but the storage compartment for sludge underneath is so great that the total volume of the tank is nearly that of an ordinary settling tank. Apparently the practice of Dr. Imhoff is to make the upper compartment large enough to hold about 2 hours' flow and to make the lower one twice this size. This makes the Imhoff tank large enough to hold about 6 hours' sewage flow, which is about the capacity of the more recently built septic tank.

The cost of the Imhoff tank is higher even with smaller capacity because of higher unit prices in both excavation and masonry linings. The question, therefore, resolves itself into this: Is the greater sedimentation, the freedom from odor at the plant and the vastly reduced labor of disposing of the sludge sufficient justification for an increased cost of construction of the tank and for the patent fee which the inventor very properly claims? It has been said that there is no opportunity for equalizing the variable flow in so small a tank and that for best results a large sedimentation tank ought to precede the Imhoff tank action. But with every criticism considered, and with full appreciation of the difficulties of the deep tank construction, the boon of an odorless sewage disposal plant is so great and the elimination of the sludge problem so gratefully appreciated, that its rapid installation in this country cannot but follow its European successes.

Water Purification from Standpoints Other Than Hygienic

At the recent International Congress on Hygiene and Demography held at Washington an interesting paper on the above subject was presented by Mr. Geo. W. Fuller. A copious extract of this paper is given below. The subject was discussed from the hygienic standpoint by Mr. Allan Hazen, whose paper was reproduced in our issue of October 16 last.

In addition to hygienic purity, a perfectly satisfactory water supply should be of good appearance as to absence of mud, vegetable stain, grosser microscopic organisms, soluble and suspended iron; and it should also be free from offensive tastes and odors, excessive hardness and abnormal corrosive action on service pipes.

Within certain reasonable limits, depending upon local conditions, all of these characteristics are worth obtaining in a first-class modern water supply. In fact, the standards of "physical and chemical quality" as distinguished from "hygienic or bacterial quality" are steadily growing higher, due to the demands of the consumers for a supply in which there is public confidence and which does away with bottled water and household devices for treating the public supply. Indirectly, this question is related to the public health through the tendency of the public to avoid for drinking purposes a hygienically pure but otherwise unattractive public water supply, and to use well water or bottled water of doubtful bacterial content.

In this paper it is proposed to outline briefly some of the recent developments in America concerning the physical and chemical features of water purification, and to refer incidentally to the historical development of some of the more important steps.

Plain Sedimentation.—Fifteen years ago or prior to the completion of the Louisville tests in 1897, the clarification of the muddy water which is so characteristic of the majority of American rivers was accomplished but partially, if at all. Plain sedimentation when applied at its best ordinarily removed only 50 to 75 per cent. of the total suspended matter. With basins holding several days' supply, such as those at Washington, Philadelphia, Pittsburgh, Louisville, St. Louis, Kansas City, Omaha, etc., the effluent as delivered to the consumers contained for weeks at a time sufficient silt and clay to make it conspicuously muddy. At times the partially settled water contained several hundred parts per million of suspended matter.

Storage Reservoirs.—In some instances the basins were large enough to serve as storage reservoirs from which the supply from the river was shut off at periods of very muddy water in the stream. This procedure was used to advantage for some years at Washington, Baltimore, Covington, York and elsewhere. It is expensive and is seldom tried at present. When the river is muddy for a period exceeding the storage capacity of the basin, the benefit of the method not only fails, but the consumers may have to use muddy water for the many weeks, diluted to a varying extent with clear water.

Coagulation and Sedimentation.—Many years ago it was the custom in the Southern States to clarify the water used at some households by putting a piece of alum in a forked stick and stirring it about in a barrel of water. Sedimentation then allowed a fairly clear water to be obtained. This practice is more or less similar to that which was followed many centuries ago in Egypt and in the Orient. Sulphate of alumina is capable of complete decomposition by the carbonates and bicarbonates of lime and magnesium naturally present in all ordinary waters, so that there is formed a gelatinous white precipitate of aluminum hydrate. This sticky mass envelops the tiny particles of clay and also the bacteria, and forms them into particles of a size that subside quite readily.

This process, which is in effect a chemical precipitation method, is of considerable assistance in that it provides a fairly efficient means of removing those minute clay particles, perhaps one-tenth of the size of the bacteria, which will not settle by plain subsidence in an indefinite period. When coagulating chemicals, such as sulphate of alumina or sulphate of iron in connection with lime, are added to the water, it is possible to obtain a fairly clear effluent, provided a proper dose of coagulent is used with respect to quantity and quality of turbidity, and further provided that a period of one or two days or more is allowed for the particles of suspended matter to deposit upon the bottom of the basin. This method has been used at quite a number of places and is still in use at St. Louis, Kansas City, Leavenworth, Omaha, Nashville, etc. It is not wholly satisfactory as compared with the results obtained by filtration, as there is no ready way to correct the poor results obtained from an inadequate dose of coagulant; this correction is much more feasible when use is made of a filter plant. This method can scarcely be called, for ordinary problems, a complete and satisfactory solution of clarifying muddy water, although its favor has been enhanced somewhat recently in conjunction with sterilization processes, such as the application of hypochlorite of lime.

Plain Sand Filtration.—Forty-five years ago sand filtration was substantially an unknown art in America. There were some crude strainers of artificial construction, but they are unworthy of detailed consideration. The art of sand filtration in America dates from about 1867, when the late James P. Kirkwood, C. E., made an extensive tour of the leading European cities and prepared a report for the Water Commission of St. Louis, Mo., detailing the results of his foreign studies.

After Mr. Kirkwood's return to America he found by tests with small sand filters that they would not remove the enormous quantities of sand, silt and clay, such as are found in the Mississippi River at St. Louis.

With the advent of the germ theory of disease there was found in America thirty years ago a feeling among engineers that sand filtration was impracticable through inefficiency and great cost for the ordinary American problem. Two or three small plants were built in the early seventies along the Hudson River, particularly at Poughkeepsie and Hudson, but the question of water clarification remained substantially in abeyance until it was pushed forward as an incidental feature of hygienic water purification.

It was the work of the Massachusetts State Board of Health, through its tests conducted at the Lawrence Experiment Station and its advocacy of the Lawrence city filter plant in 1892, that marked the beginning of the present period of widespread installation of modern filter plants in America. The Merrimac River at Lawrence contains almost no clay, and but little silt other than at rare intervals when the river is in extreme flood. The data from Lawrence, therefore while applicable for many of the problems in New England, did not offer a solution of the typical American problem of water clarification or of water purification.

Sand filters, when operated at fairly slow rates, say from 2,000,000 to 6,000,000 gallons per acre per day, are efficient in removing fairly coarse silt in quite large amounts. Fine clay particles, however, generally pass through the ordinary sand filter even when operated at rates much lower than what is called standard European practice, namely, 100 mm vertical drop per hour, or 2,650,000 gallons per acre per day. Experience shows that when the unfiltered water contains for several days at a time more than about 30 to 50 parts per million of fine turbidity, the effluent is liable to suffer from deterioration in quality, not only as to its appearance, but also bacterially.

There are some exceptions to the rule, but generally speaking, sand filters outside of the New England States and some points along the Atlantic seaboard have not been successful in treating American river waters, even after they are submitted to prolonged sedimentation. The only sand filter plant along the Mississippi River, for instance, at Rock Island, Ill., was abandoned some years ago and in its place was built a mechanical filter plant.

Sand Filters Aided by Coagulation.—In 1908 the writer conducted extensive experiments for the city of Cincinnati, Ohio, upon the clarification and purification of the muddy Ohio River water by sand filtration in conjunction with sedimentation and coagulation. Similar tests were made in 1901 at New Orleans. This method can be made efficient, but it is ordinarily more expensive than when mechanical filters are used in place of sand filters. Local conditions influence the solution of this problem. Successful use of sand filters with coagulation is to be found at Indianapolis, Washington, Poughkeepsie, and some other places. The feature which needs especial care is to see that the flocs of coagulated masses are removed from the water with sufficient care so that the surface of the sand bed does not become clogged too quickly. Ordinarily the water should undergo sedimentation for 18 to 24 hours before it reaches the sand beds. This feature adds to the cost of the complete method and in cases where insufficient coagulant is used there is some danger from serious clogging of the sand beds.

Sand Filters and Pre-filters.—At present there are few or no instances where decided exception is taken to the use of coagulants. Experience has shown that it is safe and feasible to use them where there is intelligent management. Local custom and existing works, however, in some instances force a consideration of methods in which no use is made of these very helpful coagulants. This has led to efforts to clarify water by preliminary filters as well as by sedimentation before application to ordinary sand beds. This is the method in use at Philadelphia, Steelton, Wilmington, Albany, Montreal, and some other places. If the river water is not too muddy from fine turbidity it is of considerable aid. The method has decided limitations, however, in that at times of severe flood the percentage removal of suspended matter is least when it should be most in order to prepare the water properly for normal sand filtration.

In several instances coagulation is used in conjunction with some straining device, such as the practice at Steelton, and arrangements of this general order are now being installed at Pittsburgh to aid the local sand filters.

Mechanical Filters.—Where coagulants are required, mechanical filters have rapidly come to the front during recent years. They have been installed or have been recommended for use at nearly every plant of considerable size, outside of the New England States, during the past few years. The modern mechanical filter plant is so well known from numerous published articles that no description is necessary here. It is quite different from and materially better than the earlier devices of this general type. The plant of the East Jersey Water Company at Little Falls, N. J., was placed in service in September, 1902. It was the first large plant in practice to embody the technical and engineering features developed from the tests at Louisville, Cincinnati, Pittsburgh, etc.

The type of plant ordinarily operates at the rate of about two gallons per square foot per minute. When the water is properly coagulated such filters may satisfactorily perform at rates from 25 to 50 per cent in excess of this rate. Such devices deliver a water of excellent appearance and under proper supervision they are substantially as efficient as sand filters in securing bacterial removal. These plants have recently been built with concrete tanks and hydraulically operated gate valves to control the operation of the plant.

well as automatic appliances to insure a pro rata application at all times of solutions of chemicals to the varying volume of water to be filtered. Their recent history is closely identified with a succession of mechanical improvements which allow the devices to be operated reliably and economically. The cleaning of the sand layers is done once or twice a day by reversing the flow of water for periods of five minutes or so at a time. While the water is flowing upward through the sand layer the sand is also stirred by compressed air in cases where the water is not applied at sufficient velocity (2 ft vertical rise per minute) to bring about this result.

Mechanical filters have been installed at Little Falls, New Milford, Louisville, Harrisburg, Cincinnati, Columbus, Toledo, New Orleans, and at some 300 smaller plants. This type of filter constitutes the characteristic method now in vogue in America for insuring a well clarified water supply from the ordinary American rivers which are highly charged with silt and clay. Undoubtedly it is the most efficient and economical arrangement for the majority of American water purification problems outside of certain areas along the Atlantic seaboard.

COLOR REMOVAL

For many years it has been known that ordinary sand filters will remove from 25 to 35 per cent. of the color or vegetable stain from the applied water. Such results have been obtained at numerous places in New England. It has been the endeavor in solving many American problems to secure filtered water that does not contain more than about ten parts per million of vegetable stain as measured by the platinum-cobalt standard. This is approximately the dividing line above which the color becomes readily noticeable to the consumer as seen in a glass upon the table, and especially in a porcelain bath tub. Where sand filtration will not allow a result as good as or better than this to be obtained, there has been an effort in a number of places to employ coagulants, and thus take advantage of the decolorizing effect of sulphate of alumina. This is an important factor which was considered in arriving at the recent determination in New York City to employ coagulation and mechanical filters for the treatment of the present water supply from the Croton watershed supplying the old city of New York. Sulphate of iron and lime do not give ordinarily a satisfactory color removal, as demonstrated at Toledo and elsewhere.

In some cases intermittent filters, as at Ludlow reservoir, Springfield, Mass., have aided in bringing about an unusually high removal of color. This seems to be due in part to an anaerobic decomposition having taken place in the water before its filtration. The color unites with iron in the water and is precipitated upon aeration. Another interesting feature that has been established at the new filter plant at Springfield is that when the coagulant is applied as an overdose to a part of the water to be treated, it is said that the mixture of the entire mass of treated and untreated water is decolorized to a greater extent by the sulphate of alumina than would be the case if the same quantity of coagulant were to be applied at a uniform rate of dosing to the full volume of water delivered to the purification works.

When the water to be treated contains varying high amounts of both mud and color much care is required in adjusting the required dose of coagulant to the composition of the water.

MICROSCOPICAL GROWTHS

Some years ago an unusual effort was made to prevent the appearance in water supplies of microscopical growths of algae and other organisms larger than bacteria for the sake of minimizing their influence upon objectionable tastes and odors. In some instances, particularly in Massachusetts, with unfiltered supplies, the bottom and sides of impounding reservoirs were stripped so as to obtain in the exposed surface soil only a small quantity of organic matter. This practice has not recently been followed for the large reservoirs for the new water supply of New York city, or elsewhere, particularly if the impounded water is muddy at times. It is considered better to aerate and filter the water to correct the unfavorable influence of these growths rather than to try to prevent them.

Microscopic growths have been killed in a large number of instances in America through the use of copper sulphate and to some extent by the use of hypochlorite of lime. The latter seems to have certain limitations and is not in such general use as copper sulphate.

Filters incidentally serve for the removal of microscopic growths. In some instances certain types of filamentous growths are likely to give trouble due to filter clogging. At Cincinnati experiences of this kind have been encountered and aid has been secured through the application of hypochlorite to the unfiltered water. It is a style of problem that requires special treatment in most cases.

TASTES AND ODORS

Many surface waters, particularly those which are not turbid, contain at times objectionable tastes and odors. The latter are sometimes due to growths of organisms themselves. In other cases they are due to the disintegration of the organisms and to the liberation of certain oils which are very penetrating in their nature. Still other objectionable tastes and odors are found in waters that have undergone anaerobic decomposition which causes offensive gases to be liberated.

Aeration is a great help in the removal from water of these properties which produce objectionable tastes and odors. It is one of the characteristic features of the new Catskill supply for New York city, and is being carefully considered as an aid to the filters for the Croton supply of New York.

IRON REMOVAL PLANTS

There are half a dozen plants in America mostly of small size where ground waters are aerated in order to precipitate the iron and then the settled water is applied to filters. Most of the earlier filters were of the sand filter type, but a few recent ones have been of the mechanical type. It is not a line of water purification upon which there is much experience in America as compared with Germany.

WATER SOFTENING

The large water softening plant at Columbus and three or four smaller plants provide the experience up to this time in the softening of municipal water supplies in America Many of the railroads and industrial concerns take advantage of water softening in securing satisfactory water for boiler and manufacturing purposes. Throughout the west very hard water supplies are to be found and even in the great lakes district the water is much harder than it is along the Atlantic seaboard. The cost of softening very hard water supplies has undoubtedly been a factor in retarding developments along this line. Experience has shown, however, that it is a perfectly feasible matter to soften the western waters if it is so desired.

At Grand Rapids, Mich., a mechanical filter plant is approaching completion that is to be used in conjunction with a softening plant. This plant will remove mud and vegetable color from the Grand River water and reduce its temporary or carbonate hardness by perhaps fifty per cent., so that it will equal what is called locally the "Lake Michigan standard." The total hardness of the softened and filtered water will be approximately 125 parts per million. The reduction in hardness will be effected by lime without soda.

Service pipes, particularly those of galvanized iron or wrought iron, are more liable to corrosion with filtered water than with unfiltered water. In part this is due to the elimination of substances, such as silt and vegetable matter which retard in a physical way the rate of corrosion, and in part it is due to an increase in carbonic acid which in the presence of oxygen is a very prominent factor in influencing the total amount of corrosion, the rate of corrosion and the amount of dissolved iron which may be present in water as drawn from the faucet and is thus the principal feature of unsuitability from the standpoint of iron stains. It is scarcely feasible to remove the oxygen present in water and, in fact, aeration tends materially to increase the oxygen up to the limits of the saturation point of this gas.

Carbonic acid seems to be the principal feature related to the speed and amount of corrosion of iron by filtered water. Where coagulants are used there is a corresponding increase in amount of free carbonic acid. This has led some people to consider this feature as quite a drawback to the use of coagulants, It has been studied recently in New York City from the chemical viewpoint with much thoroughness. The conclusion has been drawn that it is feasible to control the amount of carbonic acid through the proper addition of lime or soda. This feature will be an interesting part of the new Croton filter plant.

THE STATUS OF FILTRATION

With hard waters in the south and west there has been comparatively little or no difficulty as regards corrosion of pipes by filtered water. The problem, therefore, is related more particularly to the soft waters along the Atlantic seaboard.

Speaking generally, water purification as relates to filtration is on a thoroughly well established basis in America. The features that differ most essentially relate to preparatory treatments rather than to material differences in designs either of sand filters or of mechanical filters. The use of chemicals for purposes of coagulation and softening has been studied in the last few years with considerable thoroughness and the problem is one that is so related to the influence of local details that each project should be carefully studied on its own merits and the practice of copying blindly the style of works which may be in successful use elsewhere entirely abandoned.

More than ever before it is now realized that the successful methods of water purification should receive intelligent management and this is particularly the case where the type of water calls for the use of coagulating chemicals.

It will take probably ten years to complete the work planned for the improvement of Prince Rupert harbor by Mr. Virgil B. Bogue. Under instructions from the Grand Trunk Pacific Railway, Engineer Bogue has had his staff working here for several months, in preparation for making this a model harbor with its fourteen miles of length, thirty miles of water front and a mean depth of 60 feet, without a rock or bar to interfere with navigation. Mr. Bogue plans to add civilization to its natural advantages and make a sub harbor of fresh water 40 square miles in area Between the island on which Prince Rupert is located and the main land is a large salt water lake with narrow passages at each end. Part of the general plan of harbor improvement is to put locks at the passage ways and to convert the lake into a fresh water harbor fed by mountain streams, and at high tide level. The whole water front is being laid out to accommodate berths for the big ocean liners, ship yards, fishing plants, lumber yards, saw mills, ore docks, elevators, warehouses, and other industries. The plans are sufficiently comprehensive to accommodate all the requirements of a city of several hundred thousand people

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The city of Toronto contains approximately 413 miles of streets and 120 miles of lanes.

Toronto Builders Hold Social Meeting—An Interesting Address

A pleasant and instructive evening was spent at the Toronto Builders' Exchange on December 9th, when Mr. Edward A. Roberts, Secretary of the Cleveland Builders' Exchange, gave an address on "The Benefits of a Builders' Exchange, and the Desk and Exhibit Feature."

Mr. Roberts went very fully into the methods employed at Cleveland to bring about the satisfactory state of affairs which was existing at the present time, and clearly demonstrated how much could be done by concerted effort. He was a great believer in the social side of life for bringing people together and stated that his Exchange was in the habit of holding dinner parties, dances, etc. They also had frequent social and business luncheons at which short talks were given on matters of interest to the building trade. Smoking concerts were also arranged from time to time and one of the events on which he laid particular stress was the annual outing, at which various sports were taken part in. Newspaper publicity was another strong feature to be considered. The Cleveland papers devoted a certain space each week to the affairs of the Cleveland Builders' Exchange. Visits were also arranged for and the party personally conducted through new buildings, which were completed, but not yet opened to the public.

Mr. Roberts thought that builders were too apathetic as to the benefits to be derived from an Exchange, and too selfish in thinking of what immediate profits would materialize from joining, or of the honors which were to be distributed. There were also too many knockers through jealousy of those holding positions as officers in the Exchange.

The present offices of the Cleveland Exchange are particularly well equipped and a plan of the building was shown and a description of each room given. Desk space can be rented in the building for as low a sum as $30 per annum and exhibit space can also be had at very reasonable rates. In spite of these cheap rentals, the Exchange was making a good profit on the building. The privileges enjoyed by the members were many. Any message telephoned to a member who happened to be absent, was written upon a specially designed slip and put upon his desk, together with a note of the time the message came in. Bulletins were also published every day, and put upon a notice board, of any contracts which had been awarded, tenders wanted and any information which would be of interest to builders. In reply to a question, Mr. Roberts stated that they preferred this method of giving out news rather than that of mailing it to the members as the former course compelled the builder to come to the Exchange, and his great slogan was "Get the builders together"

At the conclusion of Mr. Roberts' address, Mr. G. Gander, the Chairman of the meeting, Mr. G Oakley and Mr Charles Bulley, heartily thanked Mr. Roberts for his interesting talk. This vote of thanks was enthusiastically endorsed by all those present

Answering a question put by Mr Oakley, Mr Roberts said that when it was proposed that the Cleveland Exchange move into their present quarters, many members were in arrears with their dues and the finances of the Exchange were far from satisfactory. However, the enthusiasm and active work of a few had overcome the difficulty and today their finances were in so satisfactory a condition that they were going to move into even more pretentious premises before very long Mr Roberts also said that there were too many leaners and not enough lifters, but they were doing their best to turn the former into the latter

At the conclusion of the business session, refreshments were served and the company were entertained with music

Constructional Activity at the Coast

Important Undertakings Completed, Under Way and Projected Features of New Work—Personal and Other Items

Correspondence of the Contract Record

THE great activity in the local building trades during the present year is demonstrated by the figures issued recently by the building inspector. These show that for the eleven months of the year the permits have reached $17,858,057, exceeding the amount recorded for the whole of 1911 by over $200,000. The total value of permits issued during November amounted to $1,[illegible]58,795, as against $998,212 for the corresponding month of last year, making an increase of about 50 per cent.

South Vancouver building permits for the same period were valued at $117,100, while the total reached in Point Grey stood at $115,000. When it is remembered that from the weather standpoint, November is one of the worst months in the year for building operations, the above returns must be regarded as indicating the prosperous condition of business in general at the Coast, as well as providing striking evidence of pronounced activity in the building construction field

Many Large Buildings Contemplated

It is almost certain that by the end of the year the Vancouver building total will have reached the $20,000,000 mark. Among the large works contemplated for which permits will probably be issued during December are: the Seymour street section of the new Hudson's Bay Stores Building, and the proposed Ricketts theatre on Pender street west. Only a portion of the new Hudson Bay building will be proceeded with at present, this section costing about $600,000. In this connection it is stated that the Hudson Bay Company have requested the civic authorities to make a change in the building regulations governing the height of buildings. At present the regulation reads that buildings can not be more than ten storeys or 120 feet in height. The company contends that 120 feet in a ten-storey building does not allow sufficient light and air space in each of the floors, and 160 feet is now being asked for.

Mr. Edward J. Ryan has been awarded the contract for the erection of the new theatre for Mr. E. R. Ricketts, estimated to cost upwards of $500,000. Excavation work is well under way and construction will be rushed in order that the theatre may be completed for the opening of the season next year. The property on which the building is to be erected measures 96 x 132 feet. Accommodation for 2,500 people will be provided. The structure will be four storeys in height.

A permit for the construction of the central portion of the Hotel Vancouver was taken out during November by the contractors, Messrs. Skene & Christie. This section of the new building will face on Georgia street and will cost $800,000. It will be completed in June, 1914.

A Ten-Storey Reinforced Concrete Hotel

Construction was started recently on a ten-storey reinforced concrete hotel at the corner of Burrard and Melville streets for the Ramsey Hotel Company. The building will be of reinforced concrete construction, faced with cream pressed brick and terra cotta, and will cost approximately $500,000. A feature of the main hall or rotunda will be a dome of stained glass 45 feet in diameter. This work will be made up of a series of panels and will cost $10,000. The rotunda measures 49 x 33 feet. The general office will be finished in plaster and mahogany. A palm-room will be situated in the rear of the rotunda. The flooring of this space will be in mosaic tile. The dining room will have a seating capacity for 425 persons, and will be panelled in oak. The hotel will be fireproof and as little wood work as possible will be employed. Oak will be used, however, where pannelling is required. There will be 324 bedrooms in the building. The Canadian Ferro-Concrete Company has charge of the construction. At present writing, plans for the concrete work, only, have been completed. Mr. N. A. Leach is the architect.

Within the past few weeks good progress has been made on the new Birks block at the corner of Georgia and Granville streets. The reinforced concrete frame has been completed to the full height of ten storeys and work on the remainder of the building will be pushed ahead vigorously during the winter. The Norton-Griffiths Steel Construction Company is in charge of the construction.

The same contracting firm reports that work is proceeding without interruption on the new St. Paul's Hospital on Burrard street. The reinforced concrete frame was completed some weeks ago, and satisfactory headway is being made on the exterior facing of pressed brick with terra cotta and stone dressing.

The new eight-storey London Building, situated on Pender street, is fast assuming a completed appearance. All the scaffolding and frame work has been removed from the front of the building, and the exterior stone facing is finished. The structure is valued at $250,000. The Canadian Ferro-Concrete Company had charge of the construction.

Plans were recently completed for a six-storey apartment house to be erected on the corner of Robson and Burrard streets at a cost of $127,000. The building will measure 66 x 120 feet, and will be of mill construction faced with pressed brick. Two stores will occupy the ground floor, while the upper storeys will contain 80 three and four-room apartments. It is expected that construction work will commence immediately. Messrs. Braunton & Leibert are the designers of this building.

Another Hotel of Seven Storeys

Construction will shortly commence on a new seven-storey hotel building to be erected at a cost of $150,000 on Richards street, between Pender and Dunsmuir streets. The building will occupy a space 50 x 120 feet. The outer walls will be constructed of Kittanning pressed brick on three sides, with common brick in the rear. A lobby measuring 46 x 32 feet will be situated on the ground floor. This lobby will be finished in tile and marble wainscoting. There will be 156 rooms in the building. The interior woodwork and finish of the upper storeys will be B. C. fir. Mr. Emil Guenther prepared the plans.

Work will be started in January on a three-storey school and gymnasium building for the Holy Rosary Parish, Vancouver. The building will be situated on Haro street and will be of steel frame and brick construction, with stone trimmings. A large hall with a seating capacity of eight hundred persons will be situated on the second floor. The building is estimated to cost approximately $100,000. Mr. J. J. Donnellan is the architect.

Plans have been filed for a six-storey reinforced concrete hotel building to be erected on Cordova street at a cost of approximately $75,000. The dimensions of the building are

50 x 150 feet. The exterior facings will be cream-colored pressed brick with terra cotta trimmings. The building is a novel combination of stores, church hall, and hotel accommodation. There will be 140 rooms for use in connection with the hotel portion. The dimensions of the church hall are 50 x 60 feet with a seating capacity for 550 persons. The hallway will be finished in marble with a terrazzo tile floor. The architect for this building is Mr. O. W. Moberg.

Among the contracts let during the latter part of November was one for the erection of a six-storey rooming house and stores building in the 600 block, Seymour street. This building will be of mill construction faced with red pressed brick and trimmed with imitation granite terra cotta. It will measure 50 x 120 feet. Two stores will occupy the ground floor, and the upper storeys will contain 140 rooms. The entrance hall will be decorated in marble and tile. Fir will be used as inside finish. The contract has been awarded to Robert McLean & Company. Mr. F. I. Peters designed the structure.

Goldstein Apartments, under construction

Work is now under way on a four-storey store and rooming house building at the corner of Granville and Helmcken streets. The building measures 43 x 120 feet, and will be of mill construction, faced with pressed bric kand trimmed with stone. Provision is being made in the construction to carry additional storeys if required. The entrance hall will be finished in marble and tile. Fir is to be used as interior finish throughout. The building will cost approximately $50,000. Messrs. Braunton & Leibert are the architects.

Construction is pending on a five-storey mill construction stores and apartment building to be erected on Robson street, near Thurlow. The structure will be faced with speckled buff brick and trimmed with stone. Fir will be used as interior finish except in the corridors, which are to be wainscoted in marble. The entrance hall will be decorated in marble and tile. Four stores will occupy the entire ground floor space, which is 66 x 132 feet. The upper portion of the building will contain apartments. Mr. Emil Guenther is the architect for this building, which will represent an outlay of approximately $100,000.

Messrs. Douglas & Warner recently commenced work on a three-storey store and rooming house building on Powell street. The building will occupy a lot measuring 60 x 122 feet, and will be of mill construction, faced with buff pressed brick and trimmed with sandstone. Three stores are to be contained on the ground floor, while the upper floors are to be occupied by rooms. The inside finish is B. C. fir. Marble and tile will be employed in the decoration of the entrance. The store fronts will be faced with the same material. Mr. Fred L. Townley prepared the plans. The cost of the building will be approximately $45,000.

A large deal in Granville street frontage was consummated recently at Vancouver when A. Grossman & Son purchased 50 feet adjoining the old post office for $222,000. The property is at present covered with a building, but the purchasers have stated their intention of erecting a ten-storey office building as soon as the present lease expires.

The Standard Dairy Company, Vancouver, are planning to erect a four-storey reinforced concrete building on the corner of Eighth avenue and Hemlock street. The structure will measure 80 x 100 feet, and will be faced with concrete. The interior arrangements are in keeping with the latest requirements of a modern dairy. Messrs. Braunton & Leibert are the architects of the building, which will cost in the neighborhood of $70,000.

Goldstein Apartment Block

When completed, the new Goldstein Apartment Block, situated on Beach avenue, will be one of the handsomest buildings of this kind in Vancouver. The building measures 66 x 132 feet, and is of reinforced concrete construction, faced on three elevations with matt glazed terra cotta and pressed brick. It will contain 77 apartments and will be replete throughout with elaborate improvements and furnishings. Mr. W. P. White prepared the plans and Messrs. Booker, Campbell & Whipple are carrying on the general contract.

Englesea Lodge, Vancouver

One of the accompanying illustrations shows Englesea Lodge, an apartment building completed recently at Beach avenue, Vancouver. Reinforced concrete was used in the construction. The front exterior facade was red pressed brick trimmed with stone. The side and rear elevations were faced with common red brick. The interior finish is B. C. fir.

Englesea Lodge, Vancouver

Vancouver's By-laws for 1913

Without completing consideration of all the proposed money by-laws for 1913, the Vancouver city council almost reached the $5,000,000 mark deciding to offer more money measures to the citizens in January than were passed early this year, when the money by-laws reached what was expected to be the high water mark, for some time to come. It is possible that the amount for next year will still further be increased by the sum of $80,500 for creche purposes, and by a measure providing for the purchase of the end of Georgia street for the Georgia-Harris street bridge approach.

The following statement shows the list of money by-laws which are to be submitted to the electorate early in January: Sewers, $1,000,000; opening, clearing and rough grading streets in Ward 7, $275,000; rocking, planking and macadamizing streets and lanes, $165,000; grading streets and lanes, bulkheads, boulevards, culverts and trestle bridges, $165,000; city's share of North Vancouver pedestrian subway, $47,300; site and building for East End police station, $16,000; hospital purposes, $325,000; exhibition purposes, $165,000; city market extension, $12,000; park improvements, and purchase of new sites, two by-laws, $436,000; school purposes, $853,600; cemetery improvements, $15,000; sanitary conveniences, $55,000; to complete Old Peoples' Home building funds, $50,000; water works purposes, $800,000; purchase of new cemetery, $400,000; East End viaducts, city's share of cost, $148,500; total, $4,928,400.

As seen in the above list, the largest item is for $1,000,000 for city sewers. It is proposed to extend the large Balaclava street main, southeast from Broadway towards Granville street and to construct an additional trunk sewer west of Balaclava street, ultimately to drain the Kerrisdale district in Point Grey, through West Kitsilano and the Admiralty reserve. Attention will also be given to the construction of sewers in Hastings Townsite, D.L. 301 and in the Mount Pleasant district. A considerable amount of by-law money will be expended in improving boulevards in the residential districts, rocking streets and lanes, and grading new streets in outlying sections.

Building Active in Victoria

Remarkable evidence of the substantial growth of the city of Victoria, B.C., during the present year is furnished by the following statement:

The value of building permits issued at Victoria for the eleven months of the year amounted to $7,334,515. Compared with $3,784,365 for the corresponding period in 1911, this is an increase of no less than 94 per cent. In fact, the eleven months' figures are nearly double those for the entire twelve months last year, when the aggregate was $4,026,000.

The November total of $788,500 showed a heavy increase over that for the previous month, the permit for the new High School being responsible for the fine monthly showing. Present indications are that by the end of December, permits will have reached the ten-million-dollar mark for what may be termed Greater Victoria.

The Campbell Building, now in course of erection at the corner of Douglas and Fort streets, Victoria, is of reinforced concrete construction on the cantilever system, faced with brick and terra cotta. The ground floor will be devoted to stores; the Commercial and Ladies' Club will occupy the two topmost storeys with a roof garden on top, and the intermediate floors are especially designed for the use of medical men and dentists. Messrs. Thos. Hooper & Sons are the architects and the Westholme Lumber Company the contracting firm.

Mr. S. MacLure is the architect for the Jones Building, a reinforced concrete structure four storeys in height. The building is constructed to carry two additional storeys when required. The front is completely faced with matt glazed terra cotta, giving it a striking appearance, while the store fronts on the ground floor are finished in copper and marble. The interior finish is mahogany and quarter sawed white oak, and all floors are hardwood maple. The fine Vermont marble and tile work in the building is done by Mr. O'Neil & Co., Victoria and Vancouver. The general contractors are the Sound Construction & Engineering Company of Victoria. The cost of the building was $130,000.

Construction work has commenced on the new Victoria High School on a site of eleven and a half acres at Spring Ridge. The exterior of the first storey is of granite and terra cotta, and of the others, pressed brick with terra cotta trimmings. The main entrance will be approached by broad marble steps and the walls of the vestibule will be pannelled in marble. Provision has been made for a gymnasium in the basement measuring 85 x 70 feet. The assembly hall will have a seating capacity of 516 on the ground floor, the balcony providing capacity for 300 more. In addition, there will be ten class rooms on the ground floor, with lavatories, and the principal's office and reception room, and the teachers' rooms. The second and third floors contain class rooms, library, drawing rooms, chemical laboratory, etc. Messrs. Wm. O'Neil & Company are supplying all the terra cotta, structural steel and waterproof paint.

Two other large schools now in course of erection at Burnside and Oaklands are valued at approximately $50,000 each. They are similar in construction—with pressed brick exterior and reinforced concrete floors, both built to take future additions such as extra class rooms. Mr. C. E. Watkins is the architect for both buildings, and the contracts are being handled by Messrs. Pariff Bros. and Luney Bros., respectively.

The Royal Bank of Canada recently purchased a site for a branch office at the corner of Fort and Cook streets for a consideration of $76,000. A temporary structure will be erected in the near future to accommodate the business at this point. Later it is intended to erect a permanent building—probably of reinforced concrete construction.

Railway Contracts

Mr. P. Welch, of the railway contracting firm of Foley, Welch & Stewart, who has charge of the construction of the Pacific Great Eastern Railway from North Vancouver to Fort George, recently announced the awarding of subcontracts on the line between Newport and Lillooet for a distance of 64 miles. Grading operations near Lillooet are stated to be actually in progress at the present time. Many construction camps have been opened and others are being established as rapidly as possible. The work along the Cheakamus River, especially around Bear Mountains, is exceptionally heavy on account of the rugged nature of the country equalling any railway construction ever undertaken in B. C. Headquarters camps have been established at the end of the Howe Sound line near Vancouver (recently purchased by the Pacific Great Eastern Railway), and at the town of Lillooet where supplies are now being assembled. Mr. Welch has determined to push the construction of the line with all possible speed, and expects that several thousand men will be employed at the various camps early in the new year.

Architectural News

Mr. Ernest Butterfield, secretary of the Victoria chapter of the B. C. Society of Architects, has announced the following programme of papers to be read at the meetings of that body throughout the winter season: November 21, by Mr. J. R. Grant, on "Steel Construction as Applied to Buildings;" Dec. 19, by Mr. J. C. Pendray, on "The Manufacture of Paints and Their Uses;" Jan. 16, by Mr. C. A. Newhall, on "Analysis and Tests in Building Materials;" Jan. 30, by Mr. A. L. Webber, on "Plumbing;" Feb. 13, by Mr. Paul McMichael, on "Terra Cotta;" Feb. 27, by Mr. H. C. Moss, on "Electrical Engineering," and also at a date to be announced later a paper by Mr. F. C. Engholm on "Reinforced Concrete Construction."

The Victoria chapter of the Society of British Architects met recently to listen to a paper on The Heating of Buildings from the Engineer's Standpoint, read by Mr. F. H. Sprague, of Vancouver. The speaker emphasized the economy and advisability of the engineer being called in when the architect prepared his working plans rather than after the structure was in process of construction, when alterations were apt to be costly. He also drew the attention of those present to the soundness of the principle that the quicker the steam is conducted to the point where it is to do its work the greater its efficiency.

Speaking of a purely college education, Mr. Sprague related a story of an engineer fresh from such an institution who, finding himself crammed for room when putting in a boiler, calmly rubbed out a column marked on the plan and so supplied himself with the necessary space.

South Vancouver School Board estimates for 1913 aggregating $398,000 were announced at a meeting of the Board held last month. The estimates are for buildings, additions and school sites. This equals the amount of the school bylaw for 1912.

Mr. Virgil G. Bogue, a prominent New York engineer, has been engaged by the C.P.R. to confer with Mr. F. F. Busteed, chief engineer of surveys, in connection with the double tracking of the line between Vancouver and Calgary.

Mr. W. A. Doctor, a Vancouver architect, was recently successful in securing judgment for $3,650 against The Peoples' Trust Company of New Westminster. Of this amount $3,450 was due for plans and specifications of a ten-storey building which the defendant company had planned to erect in New Westminster and the balance for the return of stock in the company which Mr. Doctor had arranged to take. After the plans were prepared and passed by the board of directors, it was decided not to proceed with the construction. The defence was a denial of the engagement.

Prices of Building Materials at Vancouver

(Delivered on Job)

Building paper, No. 1, tarred, per roll		$ .90
Building paper, plain, per roll		.70
Bricks, common, per thousand		13.00
Bricks, pressed, per thousand		15.00
Cement, Portland, per bbl.		3.00
Fire Brick, per thousand		15.00
Lime, per bbl.		1.25
Sewer pipe, per ft., 4 in.		.14
Plaster of Paris, per bbl.		1.50
Putty, per pound, bladders in 100-lb. cases		3.50
Hard wall plaster, per ton		14.50
Nails, wire per keg		3.25
Nails, cut, per keg		4.25
Mixed paint, per gallon	$1.25 to	2.75
Boiled linseed oil, gallons in bbls.		1.05
Boiled linseed oil, per gallon		1.25
Hair fibre, per ton		14.50
Fire clay, per ton		20.00
Lath, No. 1, pine		2.25
B. C. Cedar shingles, No. 1		2.20
B. C. Cedar shingles, No. 2		2.10
Lead pipe, per lb		.07
Dry colors:—		
White lead, per lb		.15
Red lead, per lb. kegs		.08
White lead, per 100 lb. in oil		10.00
Gasoline, in bbls., per gallon		.30

Canadian Railroad Development

The Canadian Pacific Railway Company has taken out a permit for the erection of a new freight office at Toronto at a cost of $75,000.

The Porcupine Rand Belt Electric Railway Co., C. H. Fullerton, Engineer, is planning to make surveys this winter for the first 75 miles of its line.

The Minister of Railways has approved the route map of the Alberta Intercurban Railway Co. which proposes to construct a system of electric railroads in South Alberta.

It is officially announced that the C. N. R. will build a chain of hotels across the Dominion. The present plan contemplates a dozen hotels, including those at Montreal and Winnipeg.

The Quebec Contracting Company, one of the contractors for building the Transcontinental Railway, has consented to liquidation on a claim by Messrs. W. Galbraith & Son, Montreal.

The annual report of the department of railways and telephones for the province of Saskatchewan shows that during the past three years the Grand Trunk Railway has increased its mileage in that province by 375 miles.

Advices from Cobalt state that temporary arrangements have been made whereby the contractors, Messrs. O'Brien, McDougall & O'Gorman, are giving a train service both east and west of Cochrane on the National Transcontinental Railway.

Every foot of the uncompleted portion of the Grand Trunk Pacific Railway in Central British Columbia will soon be occupied by graders and grading outfits. It was announced recently that sub-contracts for the last section between Fort George and Fraser Lake, a distance of 140 miles, had just been awarded.

The Canadian Pacific Railway Company recently stated at Winnipeg that they expected to construct between 1000 and 1100 miles of new trackage in the west in 1913. Of this, between 675 and 700 miles would be branch lines. There would be 300 miles of double tracking and 100 miles of sidings for terminal facilities.

Mr. K. R. Chestnut, Government inspecting engineer for the Grand Trunk Pacific Railway, states that rapid progress is being made on construction in the mountain sections and that there is every prospect that the line will be completed in 1914. On his arrival in Ottawa, Mr. Chestnut will make an official report on the progress of construction and the engineering aspects of the undertaking.

Mr. H. McCall, superintendent of the Mountain Division of the Grand Trunk Pacific Railway, with headquarters at Edson, Alta., was in Montreal recently. He stated that the new road is in splendid condition through the mountains. The work of putting the steel through to Fort George is progressing and the rail head is now at the Shuswap River, about 30 miles west of Tete Jaune Cache.

Mr. J. W. Stewart, of the contracting firm of Foley, Welch and Stewart, and president of the Pacific Great Eastern Railway, was in Victoria recently. Mr. Stewart said that every foot of the uncompleted portion of the G. T. P. line would shortly be covered with construction camps, as the contractors have just awarded the last sub-contract on the stretch of road between Fort George and Fraser Lake.

Awards have been officially made by Mr. P. Welch, the contractor, of sub-contracts for the construction of 61 miles of the Pacific & Great Eastern Railway, between Newport and the town of Lillooet on the Fraser River, B.C. Grading operations are in full swing on the north shore of Seton Lake near Lillooet, many construction camps have been opened, and others are being established as rapidly as possible.

Track laying on the Edmonton, Dunvegan and British Columbia railway from the company's terminals northwest of the city in the direction of the Sturgeon river, is in full swing and from now on will continue throughout the winter until the first 70 miles of the road has been completed. Steel will be put down by machine at the rate of from 6,500 feet a day. One hundred and twenty-five experienced track-layers are at work.

Mount Royal is to be the name of the model city to be built by the C. N. R. in connection with their Montreal tunnel scheme. The Montreal Tramways Company have been granted, by the Private Bills Committee of the Quebec Legislature, an exclusive franchise for twenty-five years, and the Montreal Public Service Corporation an exclusive franchise for fifteen years for the supply of electric light and power, subject to terms and conditions being arranged. The Montreal Tramways Company have also obtained an exclusive franchise for tramways, electric light and power, and waterworks in the neighboring parish of St. Laurent.

Application will be made to Parliament at the present session by the Grand Trunk Pacific Railway Company for an act validating and confirming an agreement entered into in April, 1911, between the Canadian Northern Railway Company and itself, providing, among other things, for the joint use by the two companies of a certain portion of railway in or near the city of Winnipeg. Similar action is also being taken by the Grand Trunk Pacific Railway Company with regard to an agreement entered into in April, 1912, between the same parties, providing, among other things, for the joint use of a certain line of railway in or near the city of Edmonton.

The plan to build a belt system of 110 miles of electric railway lines in Edmonton, was adopted by unanimous vote at the last meeting of the city council. Two hundred and twenty cars will be required to equip the entire system. Under this plan, which is subject to several slight modifications, every building site in the corporate limits will be within three and a half blocks of a car line. Commissioner Chalmers announces that at least 18 miles of lines will be built during 1913, work to begin early next spring. In addition, the municipality will expend between $10,000,000 and $12,000,000 on permanent improvements and betterments in various parts of the city. The city will also operate a street paving plant.

Just over one hundred miles have to be laid to complete the track of the Transcontinental from Moncton, N.B., to Winnipeg. Only twelve miles of track remain to be laid on the Davis contract east of Quebec; on the Macdonnell and O'Brien section, extending from a point fifty miles west of the city of Quebec to one hundred and fifty miles east of Cochrane, a total distance of four hundred and ten miles, fifty miles of steel are still to be laid. The Grand Trunk Pacific are building the remaining uncompleted section, which extends from Cochrane to Graham on Lake Superior Junction, and on the 16th of November forty-six miles of track remained to be laid; as little progress is being made during the cold weather this section will in all probability be held over for completion during the spring.

Messrs. Francis Hankin & Company, of Montreal, Toronto and Vancouver, are agents for various lines manufactured by the Tiffin Wagon Company, of which special mention might be made of their sprinklers, flushing machines, bottom dumping wagons and steel dumping cars. These are claimed to be unexcelled for service, efficiency and freedom from repairs.

From the Federal Capital

Satisfactory Progress in Construction, Weather Notwithstanding—Important Building and Municipal Work

Ottawa, December 14, 1912.

CONSTRUCTION work in Ottawa suffered a set-back last week with the severe weather, culminating in a very heavy snowfall. Nevertheless many permits are being issued by the building inspector, mostly for dwellings. The most important permit issued recently was for a factory for the Ottawa Car Company, Limited, on Slater street, to cost about $50,000. Mr. J. A. Ewart is the architect.

New Intake Pipe Completed

Reproduced herewith are two views of the new 42-in. steel pipe laid by Messrs. Laurin and Leitch, of Montreal, for the city of Ottawa. The pipe was made and laid in record time; the contract being let on October 2nd and the work completed by November 21st. On the 27th of the same month the city was being supplied with water from the new intake. The pipe was made by the East Jersey Pipe Co. of Paterson, New Jersey. Mr. William Storrie, A.M. Inst. C.E., had charge for the city.

New intake at Ottawa.

Union Bank Building

The excellent progress shown at the commencement of this structure has been well maintained to the present time. All the steelwork—supplied and erected by the Dominion Bridge Co., Ltd., of Montreal and Ottawa—has been completed. Practically all the Stanstead granite work has been finished on the two lower storeys, while in parts the stone work (Bedford stone) has been raised to the fourth storey. That part of the building now under construction will cost about $300,000, but when totally completed the cost will be approximately $600,000. The ground floor will be used as a restaurant, banking offices and also several stores. Mr. W. E. Noffke, of Ottawa, is the architect.

Progress of "The Plaza"

Since the weather turned milder, gangs of men have been working night and day on this structure, finishing the concrete along the tracks of the Ottawa Electric Railway. The cars are now running along the usual direct route from Sparks to Rideau street. "The Plaza" or "Square" has not received its proper name yet and much guessing is being made as to what name it will be given. "Confederation Square" or just "The Plaza" are the two names mostly fancied. The Government will decide this shortly.

New Fire System in Parliament Buildings

A new automatic fire alarm system has been installed throughout the Parliament Buildings and as it has proved thoroughly efficient in every way should be of interest to all municipal authorities. The system is composed of one hundred and fifty fire detectors situated throughout the corridors leading to the Commons and Senate Chambers, and in and around the Chambers themselves. The detectors are suspended from a steel bar, under which runs a copper wire. A metal slot is suspended from this wire. When the slot lowers it connects with two metal arms, which form a circuit with electric wires, on a sounding base. Immediately the circuit is formed, a little shutter will fall at the alarm board which is situated to the left of the main entrance of the Parliament Buildings. A mechanical contrivance will throw open the alarm circuit, cause the gongs to ring throughout the building, and simultaneously send an alarm to the city fire department, and set the pumps in the Parliament Buildings working at full pressure. With the exception of the top, where there is sufficient room for two small wires to run through, the detector is enclosed with glass. The new system is the "May Oatway" and the Government installation will cost about $15,000.

Connection between old and new pipes.

Ottawa-Morrisburg Railway

The above company have been granted permission by the Ottawa Electric Railway Company to use certain divisions of their tracks for a period of fifteen years, so that the Morrisburg cars can enter the city. The Ottawa-Morrisburg Company will pay the city at the rate of $450 per mile on unpaved streets, and $1000 per mile on paved streets, and also ten per cent. of revenue on business within the city limits. The new line will be a single track, and will enter the city east of Bank street, proceeding along Riverdale to Main street in Ottawa East, and thence to the Rideau Canal. Construction work will be commenced in March of next year.

Ottawa's Incinerator

The official three-day test of the incinerator took place last week but was very unsatisfactory, owing to the fact that it was not allowed to burn for seventy-two hours continuously. The incinerator is specified to burn 75 tons of ordinary unscreened house refuse and garbage during a working day of 24 hours, making its burning capacity for the 72 hours, 225 tons. The incinerator during the three day test was only operating 41.8 hours, and during that period burnt to a hard clinker 109.51 tons of refuse. The incinerator will not be accepted until another test has been made, burning it continuously for three days.

New Custom House

The site for the above building is at present being cleared. The houses thereon are being taken down and the rock excavated. The building will be constructed on Sussex street, near Rideau street, at a cost of approximately $400,000. The building is being designed by the Public Works Department.

Billings Bridge

The plans for the above bridge were prepared by the City Engineer some time ago, but owing to a dispute between the city of Ottawa and the Ottawa and Gloucester Road Company regarding the proportioning of the cost, the construction was held up. The dispute terminated in a case held last week at the fall High Court sittings. Judgment was reserved. There is a hopeful feeling that this bridge will go ahead, as the present wooden structure is in an exceedingly dangerous condition.

City Engineer Resigns

Mr. Newton J. Ker, City Engineer of Ottawa, after fifteen years' service, handed in his resignation to the Board of Control last Friday. Like many other city engineers throughout Canada he has had enough of city work, where plenty of kicks are given and no thanks received. Mr. Ker's duties were multifarious:—he was City Engineer, Manager of Water Works, Street Commissioner, Superintendent of Parks, Superintendent of the Scavenging System, and Superintendent of various other things. Ottawa has found it easy enough to get rid of Mr. Ker, but it will wait long enough before finding another to fill his place.

Excellent Granite from Chatham Township

One of the few granite companies in the Dominion is situated in Chatham Township, Argenteuil County, P.Q., and was formed some twelve months ago under the name of the Argenteuil Granite Company, Limited. The property of 120 acres consists of two hills of granite, of great depth, from which is quarried both grey and pink stone. The company have an extensive plant, including 15 cutters, air drills, &c., and also big crushing machinery, which will be utilized in crushing waste stone and quarry spauls, thus turning to account the poorer products.

The granite is pronounced by experts to be of excellent quality for all purposes, and the company have already executed a number of orders. They have supplied granite for the Sommer Building, Montreal, Canada Life Building Regina, the Herald, Calgary, the Jeanne D'Arc Monument, Montreal, and the Markland Molson memorial, Montreal, the latter being cut out of solid granite 8 feet square and weighing 15 tons. The plant has a capacity for turning out half a million blocks per annum for paving purposes, and the stone has been used by the city of Montreal for a long time with good results. The company are laying themselves out for granite work of every description, particularly for monumental purposes and buildings. Either rough or dressed stock is supplied, according to specification. The board of directors is comprised as follows: Mr. H. C. Perrin, president; Mr. J. C. Marshall, vice-president; Mr. W. W. Marshall, secretary-treasurer; and Mr. Geo. A. Campbell, K.C., director.

The Bank of British North America will erect a structure, costing over $225,000, in Edmonton in 191[illegible].

Winnipeg's Mayor-Elect

In succeeding to the important office of mayor of Winnipeg for the year 1913, Mr. T. R. Deacon, president and general manager of the Manitoba Bridge & Iron Works, Limited, will bring no little distinction to the industrial field in which he is so well known.

Mr. Deacon stands for a progressive administration of Winnipeg's civic affairs, and having a wide experience gained in a successful business career, and in his profession as a civil engineer, is considered to be a man pre-eminently suited for the position.

In a pre-election statement Mr. Deacon said: "Thanks to its unusually favorable strategic position and in a large measure to the efforts of its progressive and enthusiastic citizens, Winnipeg is now enjoying an era of prosperity and development which has aroused the wonder of the continent. And yet those mostly in touch with the situation declare in the most unhesitating terms that Winnipeg is on the eve of an era of growth and progress far surpassing that which it has already experienced. Winnipeg has cast off the swaddling clothes of its big town infancy and stands before the world accorded universal recognition as a great metropolis."

Mr. T. R. Deacon, Mayor-Elect of Winnipeg.

The new mayor, who was elected by a large majority, is generally recognized as a type of business man best fitted to guide the city's affairs at this time—a period of a decidedly critical nature owing to the impending consideration of public works of great importance and the rapid growth of the city!

The Mayor, Controllers, City Engineer, and Officials of the waterworks department of Montreal have inspected a concrete structure sunk over the end of the two new intake pipes constructed in the St. Lawrence. The structure has been built with a view to protect the intake pipes against weeds, ice, and other material. This chamber is 40 by 20, and has a large wedge-shaped nose, the back being curved, and the rear also sharpened, though less than at the fore portion. The sides at the centre are parallel with the current of the stream, and have large perpendicular rectangular openings into the centre from both sides, so that an eddy is formed into them, and the city by this device draws continually from still water instead of from the torrent a few feet away. Two water pipes, six feet in diameter, run to the shore, where they empty into the large concrete conduit, running thence to the lower level pumping station. The pipes enter the caisson at the base.

Mainly Constructional

The News in Brief—From Coast to Coast

The city of Ottawa is advertising for a waterworks engineer.

A $140,000 apartment house is to be built at Vancouver. The building will be a modern one of six storeys.

Plans are in hand at St. John, N.B., for large and important work on the water and sewerage systems.

The ratepayers of Owen Sound, Ont., will vote on January 6th on a by-law to spend $75,000 for good roads.

The city of Toronto have decided to pay cash on contracts for civic work and thus save two per cent. discount.

The city of Toronto has sanctioned the expenditure of $43,000 on the Balmy Beach and Kew Beach sewerage systems.

The Richelieu and Ontario Navigation Company have decided to spend $1,000,000 on its dock property at Hamilton, Ont.

The Northern Club of Edmonton will erect a five-storey building, 50 by 150 feet, costing $100,000 at Second street and Victoria avenue next spring.

The recently issued report of the city engineer of Kingston, Ont., showed that over $70,000 has been spent this year in the improvement of the city.

Building operations in Edmonton amounted to $13,845,487 for the first eleven months this year, an increase of 250 per cent. over the twelve months in 1911.

Mr. H. J. Fuller, head of the Canadian Fairbanks-Morse Company, has been re-appointed president of the Montreal Metal & Hardware Association.

A meeting of the members of the Calgary Builders' Exchange will be held on December 28th, when nominations will be made for officers for the ensuing year.

The first public meeting in the good roads campaign as carried on under the auspices of the St. John N.B. City and County Good Roads Association took place recently.

The entire cost of the installation of North Toronto's sewer system as shown by the report recently issued, is $287,500, or a little less than $1,000 over the estimated cost.

Pointe Clare, P.Q., has inaugurated a drainage and lighting system, and in a few weeks a water system will be completed. Mr. Dupont, of Montreal, is the engineer.

A new ten-storey hotel has been planned for Montreal at Stanley and Cypress streets. The hotel will accommodate three hundred guests. Mr. J. E. Adamson is the architect.

Tenders have recently been called for the erection of another $150,000 hotel on Hastings street, Vancouver. Work has already been started on the six storey hotel on Howe street.

The Good Manufacturing Company of Canada, Limited, has been incorporated with a capital of $300,000 to carry on a general construction business, with head office at Niagara Falls.

Building operations have been commenced at the plant of the Canadian Clay Products Company, southeast of Sutherland, Sask., on the C. P. R. The company will erect three large buildings next year, in which the brickmaking machinery will be installed. The plant will have a capacity of 100,000 bricks daily.

One hundred thousand dollars will be expended on a new Methodist church in the Highlands, a residential district in the eastern part of Edmonton, and work will begin next spring.

Victoria's building figures for the year to December 11th totalled $7,542,000 and it is expected that by the end of 1912 $8,000,000 will be exceeded. This will be double the amount for 1911.

The building permits of almost every city in the Dominion for the first eleven months of this year show an increase over the whole of 1911. Edmonton ranks first in actual increase with a gain of $9,750,000.

The Edmonton Builders' Exchange elected the following officers at its annual meeting on December 3: President, J. H. Millar; vice-president, T. H. Millar; second vice-president, A. M. Frith; treasurer, E. H. B. Walker.

The announcement has been made that Mr. Farquhar Robertson and Lieut.-Colonel Labelle will be Montreal's new harbor commissioners. It is persistently rumored that Major Stephens, the former chairman, will get the office again.

A new planing mill has just been erected in Winnipeg for Messrs. Brown and Rutherford at a cost of $100,000. Their former mill was destroyed by fire last spring and every effort has been made in the present building to avoid another fire.

It is expected that Henry Hope & Sons, Limited, of Birmingham, England, will erect a large factory at Peterborough, Ont., for the manufacture of steel sash and patent roof glazing. The ratepayers of Peterborough will vote, on January 1st, on a by-law for the purpose of granting a free site and exemption from taxes.

Millions of dollars worth of structural steel will be used in Calgary during the coming spring and summer. Already orders aggregating five millions of dollars have been placed with the big steel rolling mills of Pittsburgh, and it is feared that the big mills will be unable to supply the demand for Western Canada during 1913.

Messrs. Skene & Christie recently took out the permit for a section of the Hotel Vancouver. It is the central portion of the proposed structure, and will face on Georgia street. The permit was for $800,000. The contract calls for the completion of the section by June 1, 1914. It will be of steel construction and sixteen storeys in height.

Mr. Paul W. De Keyser, manager of construction of the Ritz-Carlton Hotel, Montreal, has died from scarlet fever aged 41. Recently he underwent a serious operation in the Victoria Hospital. Mr. De Keyser was the adopted son of Sir Polydore De Keyser, at one time Lord Mayor of London, and inherited a fortune of $2,000,000, but he lost a large sum in hotel enterprises.

The name of the Standard Drain Pipe Company, of St. Johns, P.Q., has been changed to that of the Standard Clay Products Company, and the plant increased with a view of coping with the larger volume of business. Some additional directors have also been elected, but Mr. W. C. Trotter still retains the management. The company's products include sewer pipes and bricks.

Further big building projects are contemplated in Montreal. One of the latest is a ten storey building at 57 Beaver Hall Hill, plans for which are being drawn up by Mr. Kenneth G. Rea. Dean Adams, of McGill, has suggested that a new science building should be erected, in order that additional space be given to the electrical engineering department. The department of architecture is worked to its utmost capacity, and it is suggested that there is an opportunity for establishing a really great school of architecture.

The Eastern Car Company, New Glasgow, N.S., will be in operation in July next. The power house and offices have been erected and roofed in, the foundations are all in place for the main building, which is 1,100 feet long by 300 feet deep, and the steel frame work for this structure is now being put in place. The company expect to have this building erected and roofed in by the end of March and will turn out the first car by July 1st. The works are situated immediately below those of the Nova Scotia Steel & Coal Company.

Building operations in Edmonton amounted to $13,845,487 for the first eleven months of 1912, an increase of 250 per cent. over the whole of 1911. Contractors and architects estimate that more than $23,000,000 will be invested in office, store and factory buildings and dwelling houses in 1913, if sufficient men and materials can be assembled at the opening of the season. Building contractors are paying from 10 to 15 cents an hour over the regular schedules, because of unusual demand for skilled workmen, and it is predicted that the scale will be higher during 1913.

The Granby Consolidated Mining & Smelting Company recently awarded a number of contracts for material and machinery in connection with the smelter to be erected next year at Granby Bay, B.C., Portland Canal district, where its Hidden Creek mine is located. The most important contracts, including those for the copper and lead furnaces and converters, have not yet been let. The proposed reduction works will have a treatment capacity of 2,000 tons daily and will cost, with other improvements at the mine, over $1,500,000.

The Private Bills Committee of the Quebec Legislature have made very drastic alterations in the bill of the Montreal City Council, and the aldermen are exceedingly angry. Some of them have loudly denounced the Citizens' Committee, which presented a number of amendments, many of them being favorably received. The Committee desire better government, and the Private Bills Committee, in giving heed to their suggestions, have aroused the resentment of certain aldermen, who see their influence at Quebec gradually waning. The Citizens' Committee is composed of the leading business organizations, and have put forward suggestions for the more economical government of the city. The Premier has intimated that he believes in drastic reforms, and that the city has the reputation of being the worst administered in Canada, the blame for which one alderman wants to pin on to the heads of the various departments. The Private Bills Committee declined to repeal the local improvement tax, which compels owners of property to pay for street improvements. The committee also decided that Montreal should be allowed to contribute to the removal of the G.T.R. level crossings only on condition that the tracks be sunk or laid underground and the railway operated by electricity.

We have received from Professor Blanchard, of Columbia University, a programme covering the sessions of section D, Engineering, of the Cleveland convention of the American Association for the Advancement of Science, which is to be held on Jan. 3-4, 1913. The papers scheduled for presentation at the meeting are by experts in their respective departments and cover practically every phase of highway engineering. A number of inspection trips have been arranged for those who attend the convention. On the morning of Saturday, Jan. 4, a visit will be paid to the plant of the Dickman-Duty Brick Company, at which the Dunn wire-cut lug bricks are manufactured.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Water works system to cost $8,000 planned by the village council. Clerk, Chas McArthur Ratepayers will vote on by-law January 6, 1913.

Edmonton, Alta.

Trunk sewer extension planned by the city council. Clerk, F. M. C. Crosskill. Plans, specifications, etc., at office of engineer, A. J. Latornell, and MacLean Daily Reports, Toronto. Tenders received by clerk until Jan. 18, 1913.

Hamilton, Ont.

Sewers for the East End planned by the city council. Engineer, A. F. Macallum. Tenders received by Mayor, Geo. H. Lees until Dec. 26th. Plans and specifications at office of engineer, City Hall.

Kelowna, B.C.

By-law passed to provide $40,000 to complete sewerage system. Work under direction of the Town Council.

Milton, Ont.

Street improvements planned by town council. Clerk, Wm. Painter. Ratepayers will vote on by-law in Jan., 1913.

Regina, Sask.

Supply and erection of one 5,000,000 gal. turbine pump and compound condensing vertical engine. Clerk, A. W. Pool. Cons. engineer, R. O. Wynne Roberts. Specifications, etc., from Cons. Engr. Tenders received by engineer until January 29, 1913.

Winnipeg, Man.

Concrete paving planned for Municipality of Kildonan. Sec.-treas., Harry Thompson, 215 Chamber of Commerce Bldg., Winnipeg. Concrete pavement for road on both sides of Red River. By-law will be submitted in January.

CONTRACTS AWARDED

Point Grey, B.C.

Water mains (extensions) to cost $81,000. Clerk, H. Floyd. General contractors, Evans, Coleman & Evans, Columbia avenue, Vancouver, B.C. For supplying approximately 33 miles of steel.

St. John, N.B.

Watermains and sewers to cost $20,000. Adelaide road. Sec., H. E. Wardroper. Commr. of Water & Sewerage, R. W. Wigmore. Engineer, Wm. Murdock. Work to be done by day labor. Laying 1500 ft. pipe, water and sewer pipes to be extended.

Toronto, Ont.

Sewers. Chairman, Mayor H. C. Hocken. Commissioner of Works, R. C. Harris. Contracts awarded to A. Axworthy, Lane first south of Crescent Rd., $1,300. M. H. Murphy, Ascot ave., $444, Rosemount ave., $718. J. H. McKnight Construction Co., 152 Bay street, McKay ave., $1,253, Lansdowne, $2,295. J. H. Connolly, Davenport Rd., $3,590. J. McReynolds, 42 Endean ave., Wallace ave., $3,097. City Commissioner, Edgewood ave., $280; Wallace, $5,000.

Varna, Ont. (Stanley Twp.)

Drainage, 30,500 cu. yds. Clerk, Robt. J. Richardson. General contractors, Crowley & McDonnell, Rostock, Ont.

Twp. Chisholm, Ont.

C. N. O. Ry. Co. have been authorized to construct bridge over the Wistiwasing River in the Twp. of Chisholm at mileage 204.53 from Ottawa.

Dorchester, N.B.

Reconstruction and enlargement Ry. Wharf and dredging planned by Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders to be called shortly.

Edmonton, Alta.

Railroad shops, cost $2,000,000, planned by G. T. P. Ry., to be erected during 1913-14.

Railway—Edmonton, Dunvegan & B. C. Ry Company's location of railroad from North boundary of Sec. 23-62-27 W. 2 M. mileage 68.30 to east side of Athabasca River, Sec. 15-71-1 W. 5 M. mileage 130 Alta. has been approved.

Feltzen South, N.S.

Breakwater planned by Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Tenders to be called shortly. Cribwork construction.

Gananoque, Ont.

Railroad construction. Notice of application will be made to next session of Legislature Assembly of Ontario for an act to incorporate F. A. Henry, R. A. Sibbitt, J. C. Judd, all of Ottawa; W. T. Sampson, Gananoque; J. A. Donevan, Toronto; F. B. Taber, Morton, and D. W. Green, Lyndhurst, under the name of the Gananoque, Perth & Lanark Railway Co., company to construct and operate line to use steam, electricity or other motive power between Gananoque and Lanark, with branch from near Morton through Lyndhurst and Delta to Portland.

Jordan, Ont.

Station. G. T. Ry. Co. have been directed to file plans for proposed station and facilities at Jordan, Ont., before May 1, 1913.

Montreal, Que.

Harbor terminals, cost $2,500,000, Longue Pointe Ward, planned by Manufacturers' Harbor Terminals, Limited. Interested, L. G. Read, 707 Eastern Townships Bank Bldg. Building to start next spring. Five U-shaped buildings, 6 storeys. Capital of company $8,000,000.

Missisquoi Bay, Que.

Seawall. Sec.-treas. A. H. Borden, Philipsburg, Que., will receive tenders for seawall (and raising shore road for a distance of 1200 ft.). Specifications at his office.

Newton, Ont.

Drains authorized, Twp. Mornington, by the Township Council. Clerk, Wm. Waddell, Burns, Ont. Engineer, E. D. Bolton, will shortly call for tenders.

Nanaimo, B.C.

Esquimalt & Nanaimo Ry. Company's plans of bridge No. 39.9 over the Trent River, B.C., have been approved and plans are in progress for a station to cost $30,000. H. E. Beasley, Gen. Supt., 1430 Store street, Victoria, B.C.

Ottawa, Ont.

Hopper scows—Tenders received by Dom. Govt., Dept. of Public Works; Sec., R. C. Desrochers, Ottawa, until Jan. 7, 1913, for construction of 6 steel hopper scows 300 yds. capacity each. Specifications at offices of T. H. Schwitzer, Mech. Supt., Birks Bldg., Ottawa; J. G. Sing, Confederation Life Bldg., Toronto; C. E. W. Dodwell, Dist. Engr., Halifax, N.S.; H. H. Donnelly, Supt. of Dredges, St. John, N.B., at Dept., Ottawa, and MacLean Daily Reports, Toronto and Montreal.

Tenders received by Sec. R. C. Desrochers, Ottawa, Dom. Govt. Dept. of Public Works, until Dec. 30th for machinery for a 3½ yd. Dipper Dredge.

Port Burwell, Ont.

Dock contemplated by Dom. Govt. Further particulars from David Marshall, M.P., of Aylmer, who has matter in hand; 300 ft. cement dock.

Port Mann, B.C.

Railroad planned for C. N. Ry. 25 miles from Port Mann to Steveston. Tenders will be called.

Peterboro, Ont.

Grand Trunk Railway Company have been authorized to construct two sidings for the De Laval Dairy Supply Co., Ltd.

Quebec, Que.

3 industrial locomotives required by Harbor Commissioners. Engineer in charge, St. G. Boswell. Tenders close Jan. 1, 1913.

Freight sheds at wharf for Grand Trunk and Quebec Central railways. Plans have been prepared.

Red Deer, Alta.

Alberta Central Railway Company's location of railroad from mileage 73.3 to mileage 100 west of Red Deer, Alta., has been approved.

Sutherland, Sask.

Branch railway. C. P. R. Co. have been authorized to construct its Pheasant Hills Branch across highways in Town of Sutherland, from mileage 296.11 to 317.15 Saskatchewan.

St. Andrews, Man.

Fishway on the dam planned by Dom. Govt., Dept. of Public Works. Sec., R.

C. Desrochers, Ottawa. Tenders to be called shortly.

Sturgeon Falls, Ont.
Bridge. C. P. Ry. Company's plans for trestle on extension to spur for the Spanish River Pulp & Paper Mills Co. has been approved.

Vancouver Island, B.C.
Esquimalt & Nanaimo Railway Co. has been authorized to construct bridge No. 3, 4 over French Creek and bridge No. 15.5 over Big Qualicum River, Vancouver Island, Comox Extension.

Windsor, Ont.
Wharf. Tenders received by Sec. R. C. Desrochers, Ottawa, Dom. Govt., Department of Public Works, until Jan. 13. Plans, etc., at offices of H. J. Lamb, dist. engr., Windsor; J. G. Sing, dist. engineer, Confederation Life Bldg., Toronto, and at Dept., Ottawa. Concrete superstructure.

Winnipeg, Man.
Extension to railway (to Portage la Prairie) planned by the Winnipeg Electric Ry. Co., Portage avenue. Delegates of the municipalities between Winnipeg and Portage la Prairie are investigating the possibilities of an electric interurban railway between the two cities. The Winnipeg Electric Ry. Co. will likely be asked to make a proposal for extension of its Headingly line to Portage la Prairie.

CONTRACTS AWARDED

Albert, N.B.
Wharf, cost $14,286, for Dominion Government, Dept. of Public Works. Secretary, R. C. Desrochers, Ottawa. General contractor, W. F. Wilson, Albert, N.B.

Prince Rupert, B.C.
Railroad for G. T. P. Ry. General contractors, Foley, Welch & Stewart, 739 Hastings street west. Sub-contractors in order for a 140 mile stetch of line from Ft. George to Prince Rupert are as follows: Messrs. Carleton, Griffin, Burns & Jordan, Jno. Bostock, Stewart Bros., Duncan Ross, M. Sheady, M. McHugh, Norman McLeod, Hugh McLeod, Freibury & Stone.

Public Building, Churches, Schools, etc.

Brantford, Ont.
Market building contemplated by the city council. Clerk, H. F. Leonard. Plans in progress.

City Hall building is under the contemplation of the city council. Clerk, H. F. Leonard. Plans will be prepared.

Bridgeburg, Ont.
Church to cost $13,000 planned for Central Ave. Methodist Congregation. Chairman Committee, M. House. Architect, A. E. Nicholson, St Catharines, Ont. Tenders received by chairman after Jan. 1st 2-sty., 48 x 80, stone foundation and construction.

Cobalt, Ont.
Schools to cost $10,000 under contemplation of town council. Clerk, R L. Gorman. By-law will be submitted to the ratepayers.

Edmonton, Alta.
Fire stations, cost $150,000, contemplated by City Commissioners. Clerk, F. M. C. Crosskill. Four new buildings and equipment required. To be erected during 1913. Plans will be prepared.

Ft. William, Ont.
2 schools contemplated by the Board of Education. 1 in north end of city, the other probably on Norah street. Plans will be prepared and buildings erected next summer.

Gravenhurst, Ont.
Church to cost $10,000 contemplated for Gravenhurst Hospital for Consumptives. Mr. Chester D. Massey has donated above amount to build church. Plans will be prepared.

Guelph, Ont.
Dairy buildings and stables planned for Guelph Winter Fair Board. President, Wm. McNeil. Application will be made to the Government for $50,000 for new buildings.

Kingston, Ont.
Barracks to cost $30,000, Princess St., planned for Salvation Army, headquarters, Toronto. Architect, Major Miller, 20 Albert street, Toronto. Tenders will be received at Toronto office. 2-sty., 42 x 85, stone foundation, brick construction.

London, Ont.
School to cost $80,000 under contemplation of the Board of Education. Chm., Jno. M. Gunn. To be built in the spring to replace the Aberdeen School. Competitive plans are being prepared.

Extension to Western University contemplated. Chancellor, Hon. R. M. Meredith. $100,000 has been secured which will be used to treble the present Western Medical College. Plans will not likely be prepared until spring.

Montreal, Que.
Church to cost $150,000 for Dom. Methodist Congregation. Pastor, Rev. E. I. Hart, 164 Windsor street. Architects, Badgley & Nicklas, 6110 Euclid avenue, Cleveland, Ohio. Tenders will be received by architect and owners about Feb. 1, 1913. 1-sty. and basement, stone, structural iron, copper roofing.

North Bend, B.C.
Jail building. Prov. Govt., Dept. of Public Works. Plans, specifications, etc. at Dept. Tenders received by Minister, Hon. Thos. Taylor, Victoria, until Dec. 30th.

Oak Bay, B.C.
School, cost $75,000, Monterey avenue Architect, C. E. Watkins, Green Block, Victoria, has prepared plans. Eight rooms. Provincial Government will grant 2/3 of the cost of school

Ottawa, Ont.
Abattoir, cost $80,000, is under contemplation of the Board of Works Clerk, Jno Henderson Architect not yet chosen.

Public library planned by city council Clerk, Jno. Henderson. Ratepayers will vote on by-law Jan 7, 1913

Addition to church to cost $6,500 for St Barnabas Congregation. Architect, Allan Keefer, Sparks street, Ottawa. 38 x 54, stone foundation, brick veneer construction, felt and gravel roofing Plans drawn.

Point Grey, B.C.
University Buildings to cost $1,500,000 planned by Prov Govt., Dept of Public Works. Minister, Hon. Thos. Taylor, Victoria. Architects, Sharp & Thompson, 536 Hastings street west, Vancouver, were awarded 1st prize in competition.

Schools to cost $130,000 planned by the Board. 4-room, 8-room schools to be erected at Shaughnessy, Magee, Point Grey and Eburne. Board is calling for competitive plans. Full particulars from secretary.

Quebec, Que.
Wolfe Monument, Plains of Abraham, planned by the Battlefields Commission. President, Sir George Garneau, 136 Grande Allee. Secretary, Jos. Ahern, 111 Mountain Hill. Will shortly call for tenders. To be rebuilt, grey granite construction. Monument will be an exact replica in every detail of present one.

St. Catharines, Ont.
Fire hall to cost $9,500, Lake and Albert streets, planned by city council. Mayor, Dr. Merritt. Engineer, W. D. Scott. Ratepayers will vote on by-law January 8, 1913.

Saskatoon, Sask.
Buildings on Forest Nursery Station planned by Dom. Govt., Dept. of Public Works. Sec., R. C. Desrochers, Ottawa. Supt. and foreman's residences, packing house, work shop, implement shed and stable, on the forest nursery station. Plans, specifications, etc., at Dept., at office of W. T. Mollard, Clerk of Works, Regina, Sask., and at Supt. of Forest Nursery Station, Saskatoon. Specifications at office of MacLean Daily Reports, Ltd., Toronto and Montreal. Tenders received by secretary until January 8, 1913.

Toronto, Ont.
Alterations for theatre, 264 Yonge St. Architect, Len Foulds, 21 Leader Lane, is preparing plans to convert the premises occupied by the Beemer Piano Co. into a theatre. Seating required.

Victoria, B.C.
Schools to cost $261,000 planned, at North Quadra street, $73,000, Hollywood Park, $85,000, West Victoria, $5,000, Spring Ridge, $22,000, add. Bank street $35,000, exten. Hillside $16,000, extn. Sir James Douglas $16,000.

Winnipeg, Man.
Pest House contemplated, St Boniface, in connection with St Boniface Hospital, Tache avenue Plans will be prepared.

CONTRACTS AWARDED

Cranbrook, B.C.
Farm buildings to cost $20,000 (12 sets), for C P Ry., Dept of Natural Resources General contractor, Geo Leask, Cranbrook

Edmonton, Alta.
Theatre, cost $270,000, for the Sherman Opera Co Architects and general contractors, H. L. Stevens & Co., 119 Pender street west, Vancouver, B.C. Fireproof construction, modern facilities Foundations in

Montreal, Que.
Church and Y. M. C. A., cost $5,000, Rosemont and 7th Avenues for Trustees of Institute Church 101 Union Ave. Architects and builders MacVicar & Heriot

(Continued on page 71)

Tenders and For Sale Department

City of Edmonton
Engineering Department

Invitation to Tender

Sealed tenders, registered and clearly marked on the outside of the envelope, "Tenders for Trunk Sewer Extension," and addressed to the City Commissioners, Edmonton, Alberta, Canada, will be received up to 6 p.m., **January 18th, 1913**, for the construction in tunnel of:—

Contract No. 3.
1050 lin ft 8 ft. dia. sewer.
2200 lin. ft. 6-ft. 6-in. dia. sewer.
1950 lin ft 4-ft. dia. sewer,
and accessories.

Contract No. 4.
6300 lin. ft. 4 ft. dia. sewer, and accessories.

Contract No. 5.
1200 lin. ft 6-ft. dia. sewer.
4050 lin. ft. 5-ft. dia. sewer.
1620 lin. ft. 4 ft. 6-in. dia. sewer,
and accessories.

Contract No. 6.
1400 lin. ft. 6-ft. dia. sewer.
2050 lin. ft. 5-ft. dia. sewer.
3750 lin. ft. 4-ft. 6-in. dia. sewer.
3400 lin. ft. 4-ft. dia. sewer,
and accessories.

Contract No. 7.
4050 lin. ft. 4-ft. dia. sewer.
3500 lin. ft. 5-ft. dia. sewer,
and accessories.

Contract No. 8.
4700 lin. ft. 6 ft. dia. sewer.
4700 lin. ft. 5-ft. dia. sewer.
2450 lin. ft. 4-ft. dia. sewer,
and accessories.

Each tender must be accompanied by an accepted cheque, payable at par Edmonton, drawn in favor of the City of Edmonton to the amount of one (1 p.c.) per cent., of the tender submitted, as a guarantee that, should the work be awarded, the bidder is able and willing to enter into and carry out the contract.

Each bidder may tender on one or more or all of the contracts.

The lowest or any tender not necessarily accepted.

Plans and specifications may be seen at the offices of the City Engineer, Edmonton, Alberta, Contract Record & Engineering Review, Toronto, Canadian Engineer, Toronto; Engineering Record, New York, or a complete set of plans and specifications for any contract will be sent on a deposit of Twenty-five ($25.00) Dollars, and a set covering all the contracts on a deposit of One Hundred ($100.00) Dollars. This deposit will be returned if plans and specifications are returned within fourteen (14) days of closing of tender.

51 1 CITY COMMISSIONERS.

To Engineers and Architects

Every man who puts in a tender must see your plans and specifications first. If you are in Montreal and he is in Vancouver the inspection of your plans is a problem. Let us solve that for you. Place on file copies of your plans and specifications in any or all of the "Contract Record" offices.

Contractors and manufacturers read the "Contract Record." It is the logical place to look for tenders called, and where most important works are advertised.

Send along your plans when asking for tenders put a line in your advertisement to that effect.

No extra charge is made for filing plans at one or all four offices.

Contract Record and Engineering Review

Montreal—B34 Board of Trade.
Toronto—220 King Street West.
Winnipeg—Commercial Travellers' Bldg.
Vancouver—429 Pender Street.

Sealed tenders addressed to the undersigned, and endorsed "Tender for Wharf at Windsor, Ont.," will be received at this office until 4 p.m. on **Monday, January 13, 1913**, for the construction of a Wharf at Windsor, Essex County, Ont.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the offices of H. J. Lamb, Esq., District Engineer, Windsor, Ont.; and J. G. Sing, Esq., district Engineer, Confederation Life Building, Toronto, Ont.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signatures, the nature of the occupation and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 16, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—32066. 52-1

Sealed tenders addressed to the undersigned, and endorsed "Tender for Construction of Six Steel Hopper Scows, 300 yards capacity each," will be received at this office until 4 p.m., on **Tuesday, January 7, 1913**, for the construction of Six 300 cubic yards capacity Steel Hopper Scows.

Plans, specification and form of contract can be seen and forms of tender obtained at this Department and at the offices of T. H. Schwitzer, Esq., Mech. Superintendent, Birks Building, Ottawa, Ont.; J. G. Sing, Esq., District Engineer, Confederation Life Building, Toronto, Ont.; C. E. W. Dodwell, Esq., District Engineer, Halifax, N.S., and H. H. Donnelly, Esq., Supt. of Dredges, St. John, N.B.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 13, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—32189. 51-52

Special Notice to Contractor

Could supply you with any quantity of

Relaying Rails or for Reinforcing Concrete

at a very low price, B. Shragge Iron & Metal Company, 396 Princess Street, Corner King; Telephone St. John 382, Winnipeg. 11-t.f.

A large American manufacturer wants to make desirable connections with a good reliable contractors' supply firm to handle their line of Concrete Mixers, Hoists, Elevators, etc. The line is well known and has a good sale in Canada. Apply with full particulars to E. J. MacIntyre, 4059 Perry Street, Chicago, Ill. 52-2

Reporter Wanted

Our report system gives in a concise, accurate, available manner just what information anyone handling building or engineering supplies or machinery must have to make sales. These reports are mailed daily to the leading supply houses, contractors and builders throughout Canada. We require a representative in a number of towns, and it is possible that we are unrepresented in yours, to report promptly and accurately news of sales opportunities in these trades. As it requires but a few moments daily to obtain the information our proposition should be looked upon in the nature of a side-line. Reply immediately to MacLean Daily Reports Limited, 220 King Street West, Toronto. 52-1

Sealed tenders addressed to the undersigned, and endorsed "Tender for Extension to wharf at Providence Bay, Ont.," will be received at this office until 4 p.m. on **Tuesday, January 7, 1913**, for the construction of an Extension to the wharf at Providence Bay, Manitoulin Island, Algoma District, Ont.

Plans, specifications and form of contract can be seen and forms of tender obtained at this Department and at the offices of J. G. Sing, Esq., District Engineer, Confederation Life Building, Toronto, Ont.; H. J. Lamb, Esq., District Engineer, Windsor, Ont., and on application to the Postmaster at Providence Bay, Ont.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 10, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department.—31524 51-52

Sealed tenders addressed to the undersigned and endorsed "Tender for Post Office, Eganville, Ont.," will be received at this office until 4 p.m. on **Monday, January 13, 1913**, for the construction of a Post Office Building at Eganville, Ont.

Plans, specification and form of contract can be seen and forms of tender obtained at the office of Messrs. Morris & Moore, architects and civil engineers, Pembroke, Ont., at the Post Office, Eganville, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be **forfeited if** the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

R. C DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 21, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 30517. 52-1

Situations Wanted

Graduate familiar with plant design, seeks situation with consulting or contracting engineers. Has followed "shop course" with best electrical manufacturing companies. Has also two years experience in surveying. Speaks English and French. Best of references. Apply Box 673, Contract Record, Toronto, Ont. 52-1

Situations Vacant

Saleman Wanted

Engineer salesman wanted by large manufacturing firm in Eastern Ontario. One with hoist and rock drill experience preferred. All applications treated strictly confidential. Apply, giving full particulars regarding experience and qualifications, to Box 667, Contract Record, Toronto, Ont.

City Engineer Wanted

Applications for the position of City Engineer for the City of Ottawa, addressed to the Board of Control, will be received by the undersigned until 1 o'clock p.m of **Friday, the 10th of January, 1913**. Applications to state qualifications and salary expected.

JOHN HENDERSON,
City Clerk.
Ottawa, December 20, 1912. 52-2

Water Works Engineer Wanted

Applications for the position of Water Works Engineer for the City of Ottawa, addressed to the Chairman of the Water Works Committee, will be received by the undersigned, up to 4 o'clock p.m. of **Friday, the 10th of January, 1913**. Applications to state qualifications and salary expected.

JOHN HENDERSON,
City Clerk.
Ottawa, December 20, 1912. 52-2

Sealed tenders addressed to the undersigned, and endorsed "Tender for Addition and alteration to Public Building, Oshawa, Ont.," will be received at this office until 4 p.m. on **Monday, January 13, 1913**, for the work mentioned.

Plans, specification and form of contract can be seen and forms of tender obtained at the office of Mr. Thos. Hastings, Clerk of Works, Postal Station F. Yonge Street, Toronto, at the Post Office, Oshawa, Ont., and at this Department.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures, stating their occupations and places of residence. In the case of firms, the actual signature, the nature of the occupation, and place of residence of each member of the firm must be given.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honorable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender, which will be forfeited if the person tendering decline to enter into a contract when called upon to do so, or fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

By order,

R. C. DESROCHERS,
Secretary.

Department of Public Works,
Ottawa, December 21, 1912.

Newspapers will not be paid for this advertisement if they insert it without authority from the Department. 30992. 52-1

Public Buildings, Churches, Schools, etc.

(Continued from page 69)

104 Union ave. Two storeys, 40 x 80, brick construction. Foundations in.

Toronto, Ont.
Portable school, Perth avenue, planned by Board of Education. Sec.-treas., W. C. Wilkinson, City Hall. Supply of lumber, Webb Lumber Co., Dufferin and Van Horne streets.

Business Buildings and Industrial Plants

Arrowhead, B.C.
Pulp mill. The Minnesota Pulp & Fibre Mills, Minneapolis, Minn., U. S. A. President, Thos. C. Southworth, are inquiring into matter of locating mill there.

Calgary, Alta.
Warehouse planned for The Imperial Tobacco Co. of Canada, Ltd., 18 Front street E., Toronto, Ont. Company have purchased site, on which they will erect warehouse in the spring.

Gananoque, Ont.
Additions. D. F. Jones Mfg. Co. are asking estimates for a 1-storey addition to their old plant. Architects, Byers & Anglin, 65 Victoria street, Montreal.

Extension to plant planned for Cowan & Britton, manufacturers of nails and hinges, King street.

Coquitlam, B.C.
Factory, Industrial and Dominion ave., for The Hayes Ornamental Cement and Staff Works. Main building, three stys., 50 x 200. Plans are being prepared.

Guelph, Ont.
Factory contemplated for Stewart Sheaf-Loader Co., Union avenue, Winnipeg. Plans are to be prepared at once and work will start early next spring.

Kingston, Ont.
Manufacturing plant planned for Canada Creosoting Co. Interested, E. B. Ryckman, K.C., of Ryckman, MacInnes & MacKenzie, Sterling Bk. Chmbrs., Toronto. Company incorporated with capital of $250,000. Will manufacture paving blocks.

London, Ont.
Stables to cost $3,200 planned for The Imperial Oil Co. Mgr., C. McGuire. Brick construction, zinc or patent roofing. Permit granted.

Montreal, Que.
Store and residence to cost $6,000 for Donatien Major, 853a Notre Dame W. Architect, J. A. Karch, 17 Place d'Armes Hill. 3-sty., 38 x 65, Roman brick and stone construction. Plans drawn.

Ottawa, Ont.
Addition to Bank of Ottawa Building Wellington street, planned. Present office will be carried through to Sparks street.

Quebec, Que.
Coal tower of Nova Scotia Coal Co., head office Sydney, N.S., burned. Representatives, Lorne C. Webster and M. Stobo, 83 Dalhousie street, Quebec. Will be rebuilt immediately; tower for loading and unloading ships, to cost $35,000, steel construction.

Regina, Sask.
2 stores, dance hall and pool room to cost $12,000 planned for Kleisinger Bros., Ottawa street. 1-sty., 70 x 125, brick foundation, felt and gravel roofing.

St. Thomas, Ont.
Garage and repair shop (addition), Curtis and St. Catharine streets, planned by T. McKnight. General equipment required.

Sarnia, Ont.
Manufacturing plant planned by The Anker Holt Mfg. Co., South Park, Port Huron. Company will manufacture cream separators.

Toronto, Ont.
Factory, Carlaw ave., for Roden Bros., 99½ King street west. Plans will be prepared.

Warehouse, 359 Eastern avenue, for W. H. Jackman & J. Cudmore, 59 Withrow avenue. Architect, F. R. Babington, 28 Toronto street. Stone foundation, brick construction. Plans drawn.

Alterations to bank building to cost $5,000, Queen street E. near Broadview avenue, for Bank of Montreal, Front and Yonge streets. Mgr., A. D. Braithwaite. Architects, Darling & Pearson, 2 Leader Lane. Cut stone, brick, structural steel and iron construction, felt and gravel roofing.

Victoria, B.C.
Office building for The Imperial Bank of Canada. Architect, Warren H. Milner, Seattle, Wash., has been instructed to prepare plans.

Vancouver, B.C.
Stores and apartment house to cost $127,000 for C. A. Davidson, 709 Burrard street. Architects, Braunton & Leibert, 112 Hastings west. [illegible] brick and mill construction, pressed

Brick faced, steam heating, laundry equipment required, telephones, 2 elevators. Plans prepared.

West Lorne, Ont.

Extension to broom and whisk factory planned for The West Elgin Broom & Whisk Works. Proprietors, Messrs. Lee & Jones. Additional equipment to be installed.

CONTRACTS AWARDED

Calgary, Alta.

Stores to cost $5,000 for Mrs. Palmer, 3rd street E. and 8th avenue. Architect, Leo Dowler. General contractors, Bennett & Debnam, 142 14th avenue N.E. 1-sty., 17 ft. 6 in. x 86 ft., brick, brick and cement foundation, felt and gravel roofing.

Store to cost $5,000, 17th avenue W., for A. E. Sibley, 226 8th avenue E. Architects and builders, Burroughs & Richards, Crown Block. 1-sty., 50 x 75, brick, cement foundation, felt and gravel roofing. Excavating done.

Dundas, Ont.

Stores, King and Church streets. Owner and builder, Walter Boult, plumber. 2-sty., 24 x 36, cement block construction. Excavating done.

Dutton, Ont.

4 green-houses and boiler house for W. J. Fielding, Toronto. General contractor, D. A. Cady. Work to start at once. 65 x 22, boiler, piping and heating equipment to be installed.

Edmonton, Alta.

Dairy building, cost $20,000, for the Woodland Dairy Co. Architect and general contractor, T. C. Pennie, 161 Cliff St. Work will continue through the winter.

London, Ont.

Factory to cost $4,500. Owner and builder, Geo. Heaman, 771 Queen's ave. Equipment for building, watering carts and wagons required.

Montreal, Que.

2 stores and residence (alterations) to cost $3,000, Dorchester street. Architect and builder, R. Morris, 167 Cartier street. 2-sty., 26 x 37, brick veneer construction. Foundations in.

Stores to cost $8,500, Ontario street E. for Mrs. Demers Caille, 1380 St. Catherine street E. Architect and builder, L. W. Dupre, 567 Delormier avenue. 25 x 80, brick construction. Foundations in.

Store and factory to cost $24,000 for Carl Rosenberg, St. Lawrence. Architect, R. Mont Briant, 230 St. Andre. General contractor, Henri Demers, 47 Labelle. 4-sty., 69 x 80, brick, stone and mill construction, cement foundation, felt and gravel roofing.

Store for Albert Paquin, 693 Mt. Royal. Builder, D'Assise Delorme, c/o owner. 1-sty., 50 x 25, stone foundation, brick construction.

Nanaimo, B.C.

Addition to Windsor Hotel to cost $40,000. Architects, Parr, McKenzie & Day, 570 Granville street, Vancouver. General contractors, MacKay, 413 Granville street, Vancouver, B.C. 5-sty., brick construction.

New Westminster, B.C.

Stores and apartments to cost $35,000, 6th street and Carnorvan street, for A. W. McLeod, 4th avenue and Arbutus St. Architects, Gardiner & Mercer, Westminster Trust Bldg. 3-sty., 66 x 132, pressed brick and mill construction. Plans prepared.

Point Edward, Ont.

Refrigerating plant and ice house for Northern Navigation Co. Manager, Mr. Gildersleeve, Sarnia. Architect, R. W. Fawcett, 152 Essex street, Sarnia. General contractor, Thos. Grace, 170 Stewart street, Sarnia. Refrigerator 48 x 32, ice house 200,000 tons capacity.

Regina, Sask.

Warehouse to cost $5,000 for The Saskatchewan Motor Co., Rose street. 1-sty., 75 x 113, brick construction and foundation, spruce floors, felt and gravel roofing. 1 hand hoist. Excavating done. General contractors, The Parsons Construction Company.

Toronto, Ont.

Garage. Owner and builder, F. R. Sweeney, 158 Westminster ave. Frame and galvanized iron construction. Plans ready.

Factory to cost $3,500, Alcorn Ave. Owners and builders, Toronto Whip Co., 30 Birch avenue. Brick construction, stone foundation.

3 attached stores and residences to cost $6,000, 1335-9 Dundas street. Owner and builder, H. Sheinkman, 385 Clendenan avenue. Stone foundation, brick construction, felt and gravel roof.

Core shop to cost $40,000, Cawthra avenue, for Gurney Foundry Co., 474 King street west. Sec., T. B. Alcock. Architects, Chapman & McGiffin, 59 Yonge street. Mason, Witchall & Son, 163 Havelock street. 1-sty., brick construction and foundation, cement piers, structural steel, concrete floors, concrete, slate and felt and gravel roofing, iron stairs, metal sash, wire glass, corrugated iron, steel rolling doors.

Factory and warehouse to cost $100,000, Simcoe street, for The Northern Electric & Mfg. Co., Ltd. District engineer, M. S. Pierce, 112 Bay street. Builders, Clarke & Monds, 152 Bay St. Cement foundation, reinforced concrete, brick, structural steel construction, concrete floors, felt and gravel roofing, metal sash, metal lath.

Store and residence to cost $3,000 for F. Cuney, 586 Dundas street. Architect, J. M. Cowan, 65 Adelaide street E. Mason, W. Berry, 533 Shaw street. Brick, stone foundation. Excavation done.

Vancouver, B.C.

Store and apartments to cost $45,000, 6th and Main streets, for Dr. I. W. Powell. Architects, Braunton & Leibert, Exchange Bldg. General contractors, J. H. Tolman & Co., Metropolitan Bldg. 3-sty., 50 x 120, brick and mill construction. Tenders received by general contractor for brick, concrete, lumber, sheet metal, roofing, heating and plumbing, ptg., wiring, glass, plastering.

Victoria, B.C.

Office building to cost $200,000, Johnson & Douglas streets, for The B. C. Permanent Loan Co., 330 Pender street west, Vancouver. Architect, H. S. Griffin, Dom. Trust Bldg., Vancouver. General contractor, The Sound Construction C., James Bldg., Fort street. 10-sty., structural steel, 1st storey pressed granite, 9 storeys faced with matt glazed terra cotta; 2 high speed elevators.

Residences

Calgary, Alta.

Residence to cost $5,000, Royal Sunalta. Architects and general contractors, Cook & Ryan, 2210 17th street S.W. 2-sty., 19 x 38, cement foundation, frame construction. Excavating done.

Ottawa, Ont.

Residence to cost $3,300, Muchmore, for A. E. Graburn, 17 Monk. 19 x 35, brick veneer construction, stone foundation. Plans in progress.

London, Ont.

25 residences planned by a syndicate. Interested, Max Lerner, 502 Hill street. Property is being purchased, work to start in spring. Brick and cement construction, electric lighting, plumbing, hot air heating, hardwood floors, general fittings required.

Ottawa, Ont.

2 residences to cost $6,600 for R. H. Lake, 270 Slater. 24 x 32, stone foundation, brick veneer construction. Plans in progress.

Residence to cost $7,500, Carling, for W. D. Hopper, 33 Linden Terrace. 32 x 34, stone foundation, brick veneer construction. Plans in progress.

Residences to cost $10,000 for J. W. Nimmo, 286 1st avenue, Ottawa. 19 x 43, stone foundation, brick veneer construction. Plans in progress.

Residence to cost $3,800, Sunnyside, for Robt. H. Turner, 34 Fentiman, Ottawa. 30 x 31, stone foundation, brick veneer construction. Plans will be prepared.

Residence to cost $3,500, Gladstone. Owner and builder, Benj. Webb, 97 Pretoria, Ottawa. 22 x 34, stone foundation, solid brick construction, felt and gravel roofing. Plans in progress.

Ridgeville, Ont.

Residence to cost $4,000 for A. Hyatt, Fenwick, Ont. 2-sty., brick construction. Plans will be prepared.

Strathroy, Ont.

Residence to cost $3,200 planned for T. H. Walls, Metcalf street. To be built in spring. 1½-sty., brick construction.

Toronto, Ont.

Residence, Dearbourne avenue. Architect and builder, D. E. Smith (in trust) 77 Victoria street. 2-sty., brick foundation, brick construction, tile, oak and pine floors, shingle roofing.

Victoria, B.C.

Residence, cost $15,000, Rockland and St. Charles street, for Dr. W. F. Fraser, 732 Yates street. Architect, Thos. Hooper, 5th floor, Hibben-Bone Block. Two storeys and basement, stucco, steam heating. Plans in progress.

CONTRACTS AWARDED

Brantford, Ont.

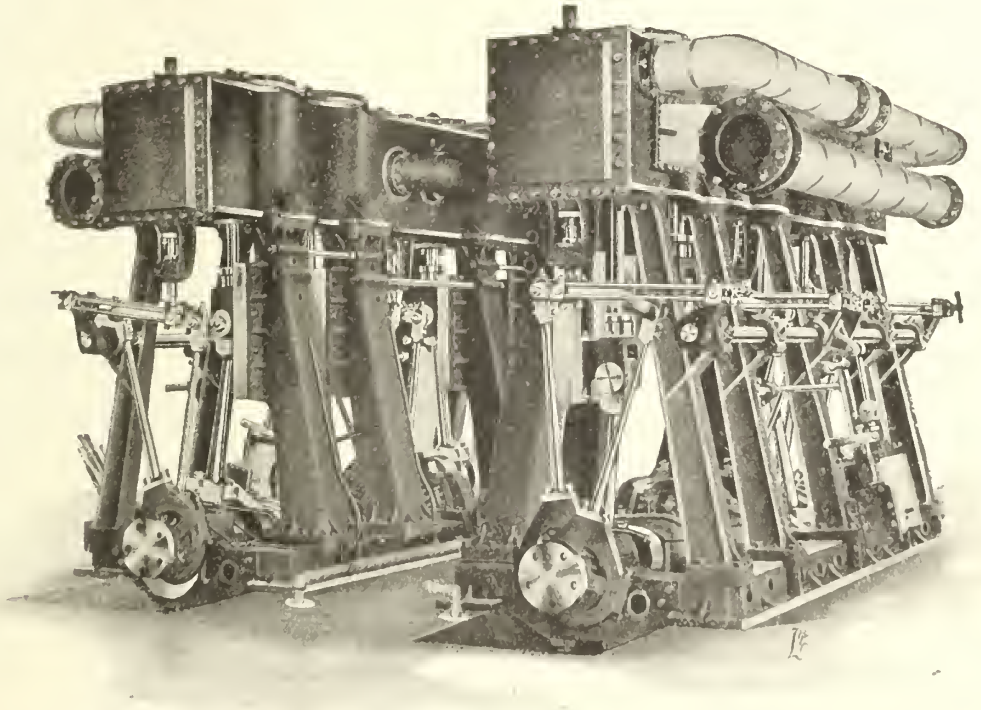
Residence. Owner and builder, Harry Wilson. 1-sty., 28 x 26, cement foundation, brick construction.

Calgary, Alta.

2 residences to cost $8,000, Elbow Park. Owners and general contractors, Consolidated Building & Investment Co., 206 David Block. 2-sty., 19 x 35, cement foundation, frame construction. Excavating done.

Residences to cost $4,000 (Balmoral). Owner and general contractor, W. J. Elheran, 1529 15th avenue west. 2-sty., 19

ENGINES and BOILERS



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14 Strachan Avenue Toronto, Canada

[illegible] frame, cement foundation. Excavating started.

Hamilton, Ont.

Apartment house, remodelling, cost $7,000. East ave. for J. Pringle, Jr., 36 Hess street south. Architects, Watt & Blackwell, Lister Bldg., James St. N. Masonry, W. A. Smith, 26 Sherman ave.

Carpentry, R. W. Miller, Rebecca St. Roofing, Jno. Riddell, 12 Ferguson ave. N. Tile work, Kent Garvin Co., King St. S. Wiring, F. Murphy, King William St. Plastering, Hill Bros., 307 Emerald St. N.

Residence to cost $2,500. Owner and general contractor, T. J. Rousell, 299 Wilson street. Brick construction. Permit granted.

Residence for George Coty, 1108 Barton street E. General contractor, J. Fitzgerald, 159 Avondale avenue. 2-sty., brick construction.

Montreal, Que.

Three residences, cost $8,700. Owner and builder, V. E. Brien, 34 Adam Viauville street. Brick veneer construction.

Apartments, cost $4,000. Delanauclierc. Architect and builder, Joseph Legare, 414 Garnier street. Three storeys. 37 x 36, brick construction. Foundations in.

Apartments to cost $10,000. Builder and owner, J. E. Robin, 589 9th avenue, Rosemont. 3-sty., 50 x 44, cement foundation. Foundations in.

2 residences to cost $6,000 for Henri Montcalm, 287 Valois. Builder, J. A. Gagnon, 1851 Notre Dame E. 3-sty., 27 x 40, cement foundation, pressed brick construction.

Flats to cost $20,000, Esplanade. Owner and builder, Ubald Beaudoin, 1959 Mance. 3-sty., 100 x 65, cement foundation, stone construction. Foundations in.

Residence to cost $11,000, Vendome. Owners and general contractors, D. H. Scott & Co., 163 Grey avenue. Architect, Gegnon, Beaver Hall Hill. 2-sty., 24 x 48, cement foundation, brick construction.

2 residences to cost $6,000, Bordeaux. Owner and builder, George Dufiesre, 33 Delanaudresne. 2-sty., 50 x 38, cement foundation, pressed brick construction. Foundations in.

Residence to cost $6,600, Bordeaux. Owner and builder, Noe Levesque, 786 Dorion. 3-sty., 48 x 40, stone foundation, brick construction. Excavation done.

Residence to cost $4,200, 176 Regent for James Evans, 58 Marin. Architect, C. L. Cooper, 221 Milton. General contractors, Reid, McGregor & Reid, 747 St. Catherine W. 2-sty., 25 x 34, brick, cement foundation.

Residence to cost $6,600. Owner and builder, Charlemagne Levesque, 319 Beaudry. 3-sty., 46 x 41, brick, stone foundation. Excavating done.

Residence to cost $4,500 for Mdm. J. B. Barbeau, 99 Ave. de l'Eglise. Builder, J. B. Barbeau. 3-sty., 25 x 26, pressed brick construction, cement foundation. Foundations in.

Residence to cost $4,000 for Domenico Caminato, 25 Grubert Lane. Builder, P. Frank, 45 Mt. Royal avenue. 2-sty., 28 x 35, cement foundation, brick construction. Excavation done.

Residence to cost $15,000, Harvard avenue. Owner and general contractor, J. H. Hand, 609 Belmont avenue. Architect, W. S. Wright, 204 St. James St., Westmount. 2-sty., 80 x 66, cement foundation, brick construction and gravel roofing. Excavation done.

Flats to cost $12,000, Casgrain. Owner and builder, David Labelle, 2151 St. Dominique. 3-sty., 75 x 46, cement foundation, brick construction, felt and gravel roofing. Excavation started.

2 residences to cost $6,000, 4th Ave. Owner and builder, Xavier Boileau, 539 Bourbonniere. 3-sty., 50 x 40, stone foundation, pressed brick construction, felt and gravel roofing. Foundations in.

Ottawa, Ont.

Residence to cost $7,000 for Thos. Lawson, sr., Woodlawn avenue. Builder, Jas. A. Low, 105 Brighton street. 28 x 50, stone foundation, brick veneer construction.

Residence to cost $3,700 for Louis Mainville. Builder, N. Beadry, 167 Drummond. 34 x 25, and 28 x 12, brick veneer construction, stone foundation.

Residence to cost $5,500, Centre, for Miss C. McNaughton. Builder, Geo. A. Eaman, 297 1st avenue. 26 x 38, stone foundation, brick veneer construction.

Residence to cost $4,200. Owner and builder, G. Ramsay, 399 Nepean. 27 x 31, cement foundation, brick veneer construction.

Residence to cost $20,000 for Ed. Cluff. Builder, R. A. Kemp, 149 1st Ave., Ottawa. 40 x 52, stone foundation, brick veneer construction.

Point Grey, B.C.

Residence to cost $13,000, Angus Drive, for C. M. Merritt, 48 Hastings street west, Vancouver. Architects, Horton & Phipps, Pacific Bldg., Vancouver. General contractor, J. E. Wright, 466 10th avenue E., Vancouver; frame construction.

Toronto, Ont.

3 pair residences to cost $12,000 (30-2, 50-6 Earl Grey Rd.). Owner and builder, J. D. Young & Son, 160 Rusholme road. Brick construction, stone foundation.

2 detached residences to cost $6,000 (2-4 Jean street). Owner and builder, M. E. Sadner, 13 Keele street. Architect, J. Hunt Stanford, Bloor and Ossington avenue. Stone foundation, brick construction.

Residence to cost $3,000, Rosemount avenue. Architect and builder, G. S. Barber, 3 Awde street. Brick, stone foundation.

Residence to cost $4,000, Indian Trail. Architect and builder, J. W. Butchart, 462 Indian road. 2½-sty., 28 x 32, brick foundation, brick construction.

Power Plants, Electricity and Telephones

Chesterville, Ont.

Power and lighting system is under the contemplation of the village council. Clerk, T. T. Shaw.

Parry Sound, Ont.

Lighting system to cost $5,500 planned by the town council. Clerk, E. E. Armstrong. A by-law will shortly be submitted to ratepayers. To be separate from balance of electric power.

Port Alberni, B.C.

Lighting materials, 56,000 lin. ft. of wire, 35 street lamps, transformers, cross arms, insulators, and erecting 350 poles for municipal lighting system. Tenders received by clerk R. F. Blandt until Dec. 24th.

St. Jean Deschaillons, Que.

Telephone apparatus required. The Lotbiniere & Nicolet Telephone Company are in the market for all lines of telephone apparatus.

Winnipeg, Man.

Tenders received by secretary M. Peterson until Jan. 24 for 3 step down transformers, 2700 kw. each. Specifications at office of engineer.

Woodstock, Ont.

Extension to natural gas system planned by Woodstock & Brantford Gas Co. Mgr., W. Sutton. Options on various properties have been obtained and wells are being sunk.

Miscellaneous

Winnipeg, Man.

Pig lead to cost $6,000. Board of Control. Sec., M. Peterson. Engineer, H. N. Ruttan, 223 James avenue. General contractor, The Canadian Metal Co., 301 Chambers street.

Business Notes

Niagara Falls, Ont.

Hotel, (Bridge street, "American") burned. Owner, Wm. Flasherty, Sen., Simcoe street. Loss $7000, covered by insurance.

Prince Rupert, B.C.

The G. T. P. Ry. Company's hotel building was totally destroyed by fire; loss $50,000.

Ridgetown, Ont.

Draders Cooper Shop burned. Mgr., W. Kindree. Will rebuild, complete new equipment and tools required. Brick or cement construction.

Stratford, Ont.

The Stratford Mill Building Co., Erie and Gore streets, engine room, blacksmith, machine and work shops completely destroyed. Loss about $60,000.

Sackville, N.S.

Business block owned by Miss Jane Estabrookes burned. Occupants, Harris Miller, general store, and Jno. McLaren, barber. Loss $27,000. Insurance about $10,000.

Sorel, Que.

Restaurant and residence of J. F. Lavall, Charlotte street, burned; loss $6,000. Will rebuild.

Toronto, Ont.

Factory of G. A. Rudd, Harness Co., 787-93 King street west, burned. Loss $30,000. Plans will be prepared for rebuilding.

Thetford Mines, Que.

Lumber factory of Solomon Herbert burned; loss $20,000. To be rebuilt at once.

Yarmouth, N.S.

Newspaper and job office of "Yarmouth Light" burned. Chas. Carey, proprietor. Type and composing room furnishings ruined; loss heavy. Insurance about $3,000.

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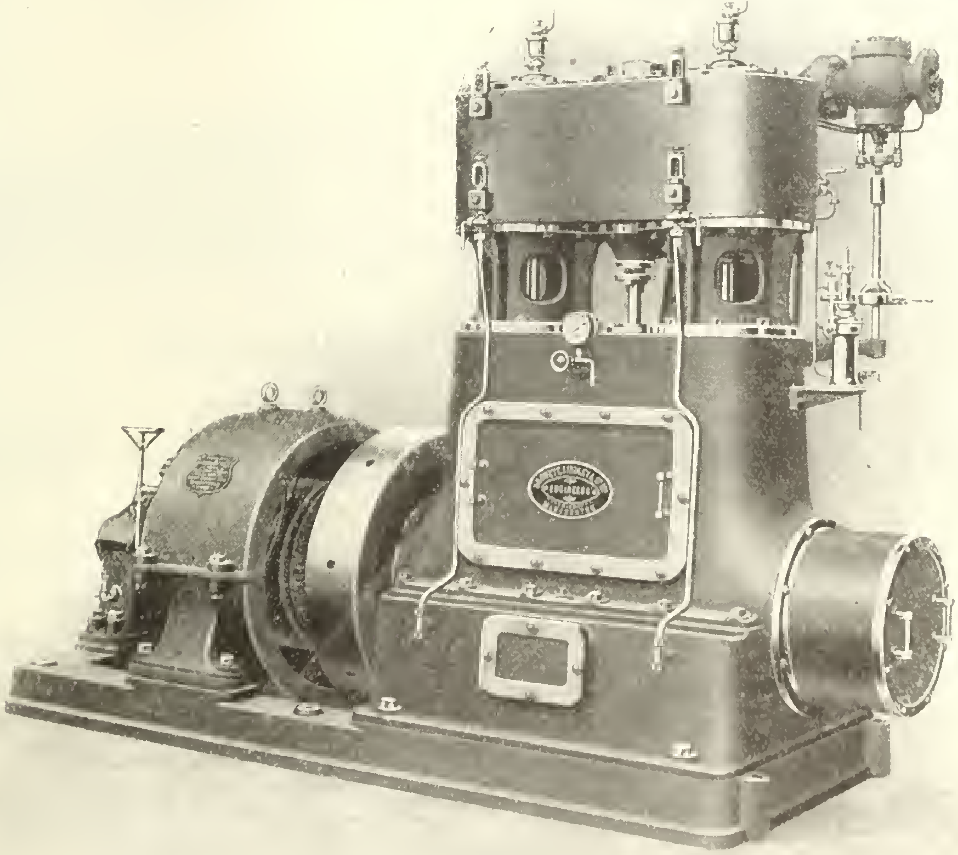
These engines are simple in construction and all parts are easily accessible. Owing to the efficient system of lubrication and perfect balance of the moving parts the engines run silently and steadily under all conditions of load. They are as simple as can be manufactured to give great economy combined with high efficiency. We can refer to scores of highly satisfactory installations in electric power and tramway plants, collieries, cotton and paper mills, steel and iron.



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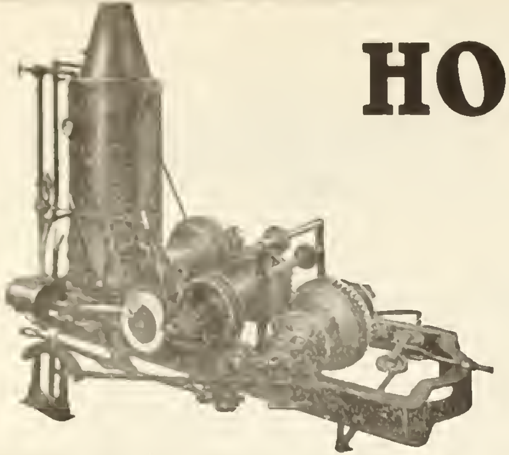

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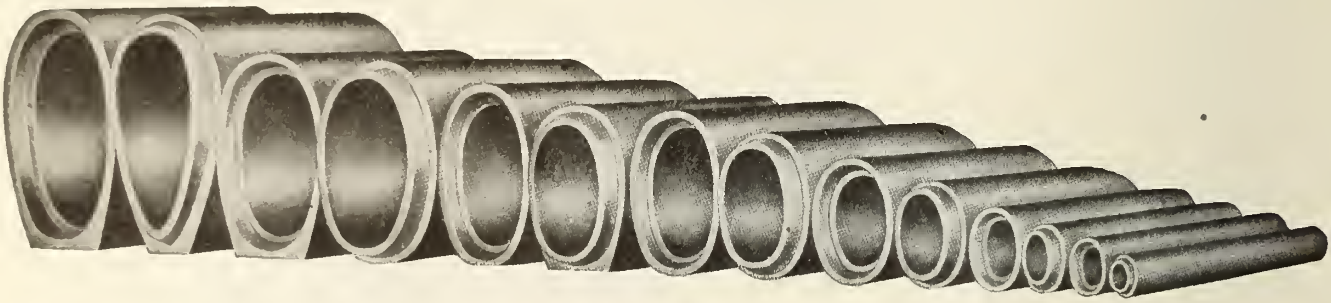

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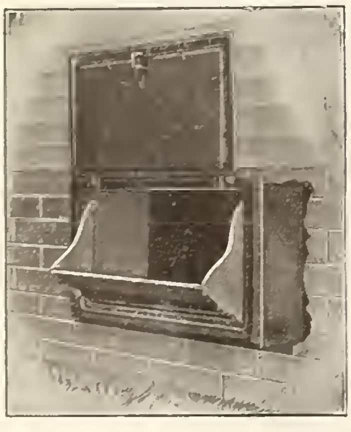

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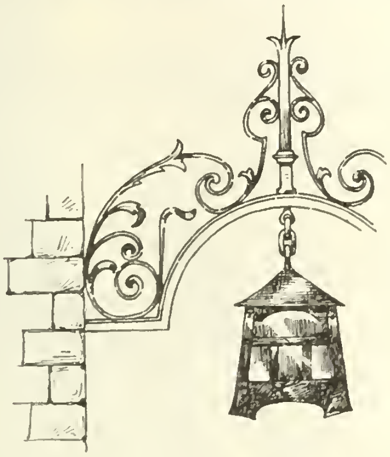

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Architectural Hardwood Finishing, by George Whigelt. Published in 1906 by The Painters Magazine, New York. 124 pages. Price 50c.

Modern Workshop Hints, by Robert Grimshaw, M.E. Published in 1902 by Sampson Low, Marston & Company, London, Eng. 428 pages, illustrated. Price 50c.

Practical House Framing, by Albert Fair. Published in 1909 by Industrial Book Company, New York. 108 pages, illustrated. Price 50c.

Hints for Carpenters, by Albert Fair. Published in 1909 by the Industrial Book Company, New York. 144 pages, illustrated. Price 50c.

Architect, Owner and Builder Before the Law, by T. M. Clark. Publisted in 1905 by The MacMillan Company, New York. 387 pages. Price $1.00,

Properties of Steel Sections, by John C. Sample, C.E. Published in 1905 by McGaw Publishing Company, New York. 121 pages, illustrated. Price 50c.

Modern Plumbing, illustrated, by R. M. Starbuck. Published in 1907 by Norman W. Henley Publishing Company, New York. 329 pages, illustrated. Price $2.00.

Reinforced Concrete, by A. W. Buel. Published in 1906 by the Engineering News Publishing Company, New York. 500 pages, illustrated. Price $1.00.

Resistance of Materials, by N. de Tedasco and A. Maurel. Published in French, in 1911. 650 pages. Price $1.00.

The Sanitation of a Country House, by Dr. Harvey A. Bashore. Published in 1905 by John Wiley & Sons, New York. 98 pages, illustrated. Price 50c.

Modern Cement Sidewalk Construction, by Charles Palliser. Pub. B. T. Batsford, London. 776 pages, illustrated. Price 50c.

Modern Practical Carpentry, by George Ellis. Published in 1906 by B. T. Batsford, London. 372 pages. Price $1.50.

Light & Heavy Timber Framing Made Easy, by Fred T. Hodgson. Published in 1909 by Frederick J. Drake & Company, Chicago. 396 pages, illustrated. Price 50c.

Reinforced Concrete—A Manual of Practice, by Ernest McCullough, C.E. Published in 1908 by Cement Era Publishing Company. 126 pages, illustrated. Price 50c.

A Practical Treatise on the Steel Square, by Fred T. Hodgson. Published in 1904 by Frederick J. Drake & Company, Chicago. 222 pages, illustrated. Price 50c.

The Up-to-Date Hardwood Finisher, by Fred T. Hodgson. Published in 1904 by Frederick J. Drake & Company, Chicago. 210 pages, illustrated. Price 50c.

Practical Concrete-Block Making, by Charles Palliser. Published in 1908 by Industrial Publication Company, New York. 74 pages, illustrated. Price 50c.

Engineering as a Vocation, by Ernest McCullough, C.E. Published in 1911 by David Williams Company, New York. 202 pages. Price 50 cents.

Hydraulic Cement, Its Properties, Testing and Use, by Frederick P. Spalding. Published by John Wiley & Sons, New York. 266 pages, illustrated. Price 50c.

The Building Mechanics' Ready Reference—Stone and Brick Masons' Edition, by H. G. Richey. Published in 1907 by John Wiley & Sons, New York. 266 pages, illustrated. Price 50c.

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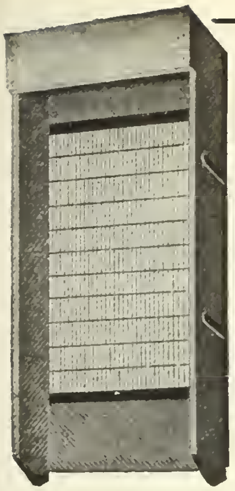

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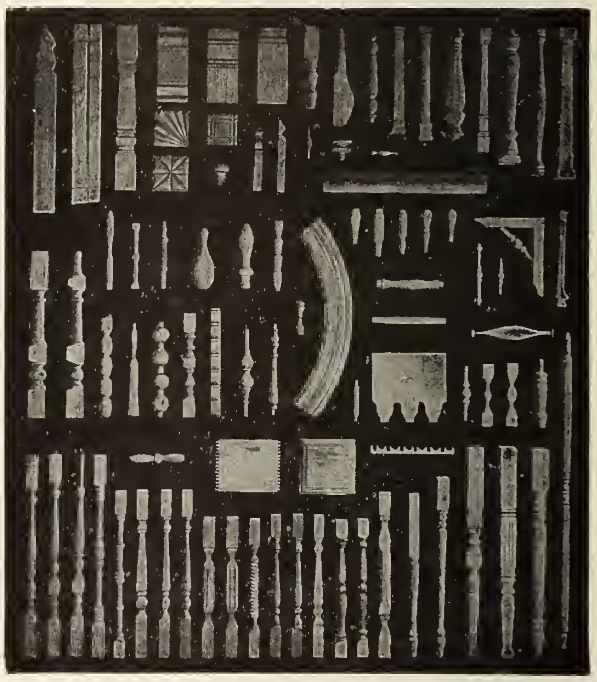

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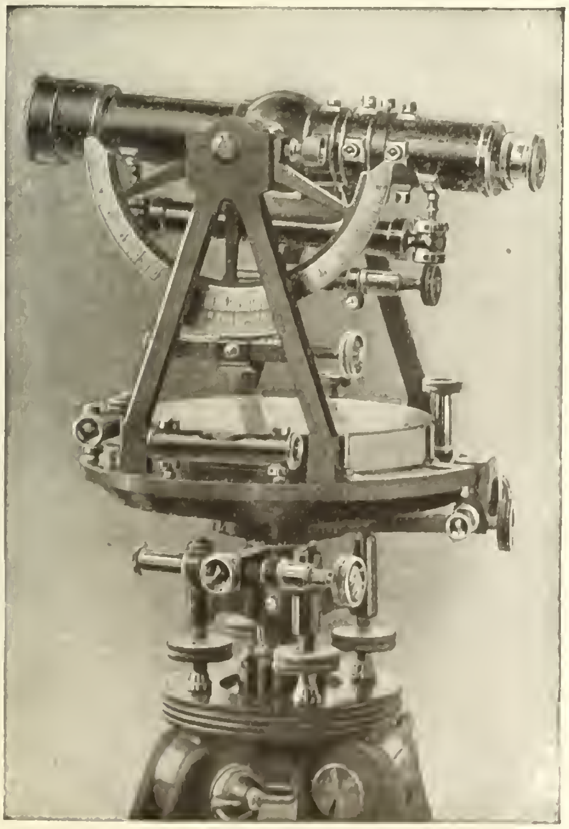

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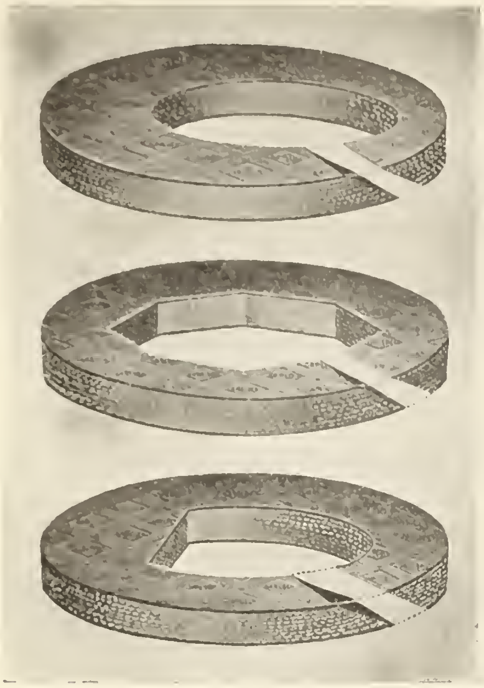

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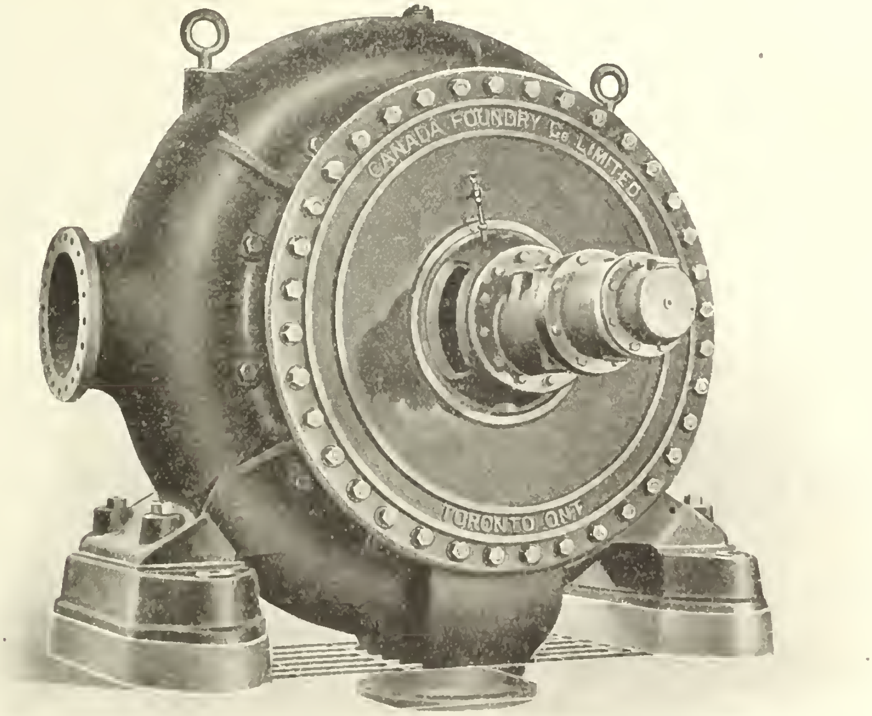

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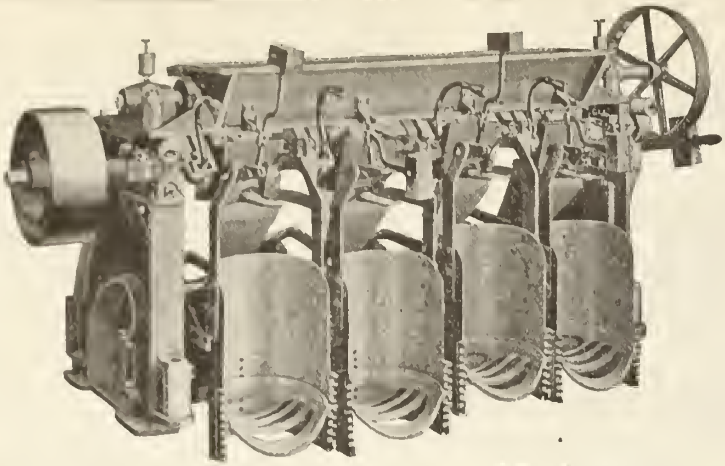

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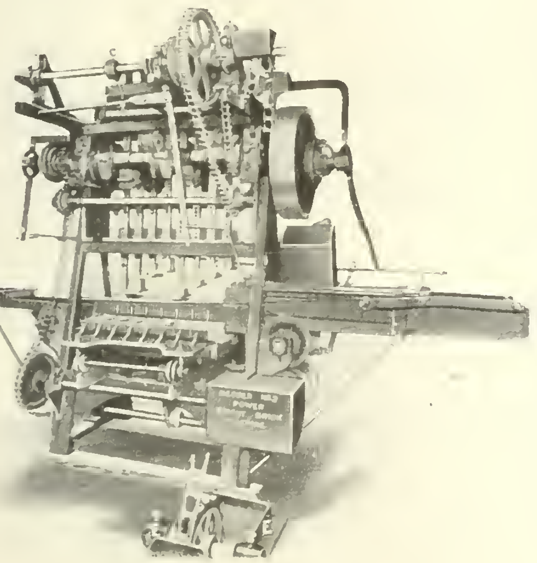

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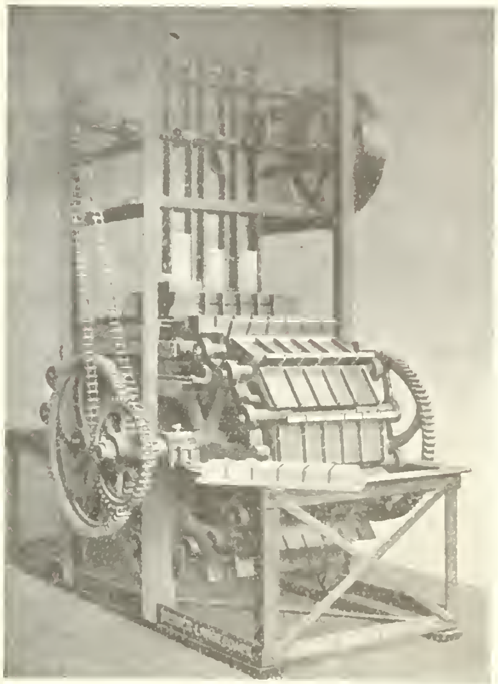

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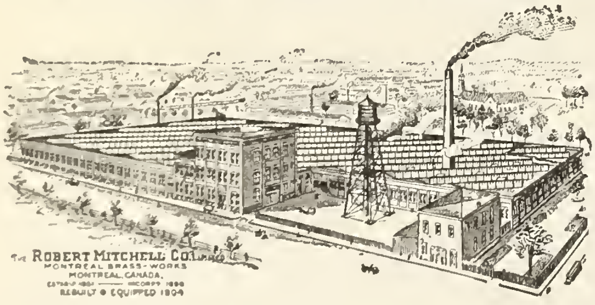

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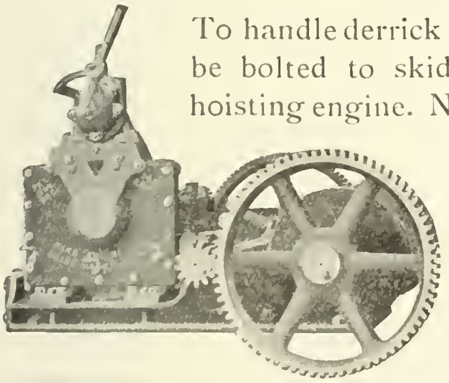

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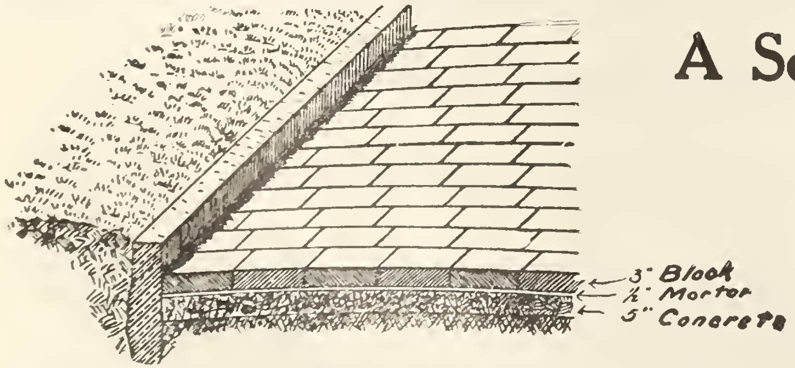
Woods Building - Ottawa, Ont.



A Scientific Pavement

must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by

Asphalt Block Pavements

Send for Descriptive Literature

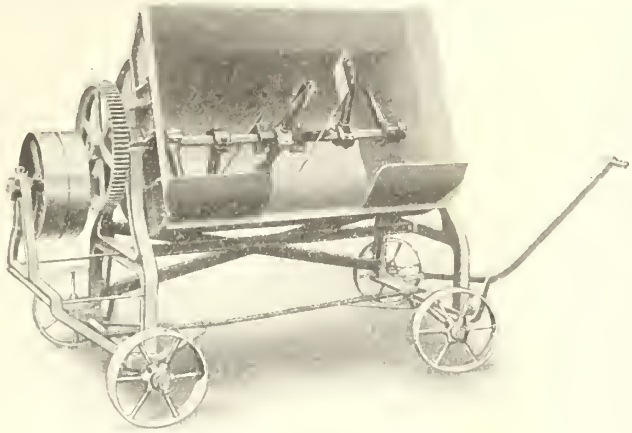
The Ontario Asphalt Block Company, Limited - Windsor, Ont.

THE Underwood embodies in one machine all that can be expected in a typewriter. It is sold at the price which should be paid for a machine of its quality.

United Typewriter Co., Ltd.

All Canadian Cities

The Mixer With a Record



THE BLYSTONE HAND TRUCK MIXER

For combination shop and outside use this Hand Truck Mixer is acknowledged to be the very best on the market. It has been used on hundreds of sidewalks and foundation contracts with unqualified success. It is strongly built and so simple in design that it will never give any trouble with repairs.

Strongly Made—Well Balanced Easy to fill—Easy to Dump

Send for Catalogue

The Blystone Machinery Company

61 Railroad St., CAMBRIDGE SPRINGS, Pa., U.S.A.

Full line of Blystone Mixers carried in stock by
The A. R. WILLIAMS MACHINERY COMPANY, Limited
Contractors Department No. 1, TORONTO, CAN.
Sole Distributors for Canada

A Building Worth Erecting Is Worth Protecting

The great destroyer of buildings is fire, and when it comes from without, the roof almost always ignites first.

ASBESTOSLATE

Cement Shingles

TRADE MARK
ASBESTOSLATE
ASBESTOS
SHINGLES

protect a building perfectly from catching fire in this way. Made only of Asbestos and Portland Cement, they are absolutely proof against sparks, cinders or burning brands.

Even when the fire starts within, this fireproof roofing holds tight, helps to check and smother the blaze, and prevents it from spreading to near-by buildings.

Asbestoslate Cement Shingles are as attractive and as durable as they are protective. Write for Booklet C. R. telling all about them.

Asbestos Manufacturing Co., Limited

Address
E. T. Bank Bldg., Montreal

Factory at
Lachine, Que. (near Montreal)

THOS. & WM. SMITH, LD.,
WIRE ROPE MANUFACTURERS,
NEWCASTLE-ON-TYNE, ENGLAND.

ELECTRIC CABLEWAY OVER THE ZAMBESI RIVER AT THE VICTORIA FALLS.
Span, 870 feet. Working Load, 10 tons. Main Cable 8¼″ circ. Breaking Stress of Main Cable, 275 tons.
Main Cable supplied by THOS. & WM. SMITH LTD., Newcastle-on-Tyne.

HIGH-CLASS WIRE ROPES
For CONTRACTORS' WORK, such as BLONDINS, CRANES, INCLINES, BALLAST ROPES, &c., &c., and all classes of work requiring Wire Ropes.
AGENTS IN CANADA
Evans, Coleman & Evans, Ltd., Vancouver. Angel Engineering & Supply Co. Ltd., St. John's, N.F.
Baines and Peckover, Toronto.
REPRESENTATIVE FOR CANADA:
D. W. CLARK, P.O. Box 431 MONTREAL, QUE.
USE ONLY SMITH'S "RED THREAD" WIRE ROPES.

Current Prices of Building Material.

BRICKS

The following are wholesale prices delivered at Toronto:—

	Per M
No. 1 dry pressed red brick	$18 00
No. 1 dry pressed buff brick	18 00
Red Stock Bricks	12 00
Grey Stock Bricks	12 00
Wire cut bricks for foundation work	12 00
Porous terra cotta bricks	15 00
No. 1 enamelled bricks, all colors, from	$80 00 to $150 00

LUMBER (Building Material)

Hemlock Lumber

2 in. x 4 in. to 2 in. x 12 in., 8 to 14 ft.	$23 00	
2 x 4 to 2 x 12, 16 ft.	24 00	
2 x 4 to 2 x 12, 18 ft.	26 00	
1 in. Hemlock, No. 1	20 00	23 00
No. 1 Hemlock Decking	24 00	
No. 2 Hemlock dimension and 1-in.	16 00	18 00

Pine—

1 in. common pine 8 to 12 in. wide rough	27 00	30 00
2 in. white pine Bill stock	29 00	33 00
7/8 x 8 and 10 in. pine shelving	36 00	40 00
7/8 x 12 in. pine shelving	45 00	
No. 1 white pine flooring	32 00	
No. 1 spruce flooring	26 00	
No. 1 pine decking D2S	30 00	
Spruce Decking	25 00	
No. 1 pine V. or beaded sheeting	35 00	
No. 2 pine V. or beaded sheeting	31 00	

Pine trim for paint finish—

4 in. casing per 100 ft.	2 00
5 in. casing per 100 ft.	2 25
8 in. pine base, per 100 ft.	3 25
10 in. pine base, per 100 ft.	4 25
1 in. pine window stool	2 45

Shingles—

XXX B. C. Clear Shingles, per M.	3 60
N. B. Extras	3 50
N. B. Clears	2 90
No. 1 pine lath, per M.	1 75
No. 2 pine lath	1 25
No. 1 spruce lath	1 00

Cedar Posts Fence

5 in. at small end, each	25
7 in. at small end, each	35
Hemlock lath	3 25

WINDOW GLASS

Following are the prices of glass at Toronto, Hamilton and London. The discounts are 15 per cent. for Star and 15 per cent. for D.D.

	Star	D.D.
10 to 25 united inches	$4 25	$ 6 25
26 to 40 "	4 60	6 75
41 to 50 "	5 10	7 50
51 to 60 "	5 35	8 50
61 to 70 "	5 75	9 75
71 to 80 "	6 25	11 00
81 to 85 "	7 00	12 50
86 to 90 "		15 00
91 to 95 "		17 50
96 to 100 "		20 50
101 to 105 "		24 00
106 to 110 "		27 50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:

MONTREAL

	Star	D.D.
25	$3 25	$4 75
40	3 45	5 20
50	3 85	6 00
60	4 10	6 50
70	4 35	7 00
80	4 85	7 50
85	5 30	8 25
90		9 75
95		10 75
100		12 50

Net prices per 100 feet F.O.B. Montreal.

WINNIPEG

	4ths Single	3ds Double
Up to 25 u i	$3 50	$5 00
26 40	3 75	5 50
41 50	4 25	6 25
51 60	4 75	7 00
61 70		8 00
71 80		9 00
81 85		10 00
86 90		11 00
91 95		13 00
96 100		16 00

Net prices per 100 ft F.O.B Winnipeg

STEAM FITTERS' AND PLUMBERS' SUPPLIES

Standard compression work, 60 per cent.

High grade compression work, 55 and 5 per cent.

Fuller work, 65 and 5 per cent.; No. 0, 70 and 10 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatday stop and stop and waste cocks, 60 and 10 per cent.; roundway, 60 and 5 per cent.

No. 4 compression bath cock	net $1.85
No. 4½ Fuller's	net $2.50

Square head brass cocks, 60 per cent.

Lead Pipe

Lead pipe, $7.50 net, less 10 per cent.; lead waste, $9.00 net, less 10 per cent.; caulking lead, 6½ cents per lb.; traps and bends, 30 per cent.; pig lead, 6½c. lb.

Iron Pipe

Size (per 100 ft.)	Black		Galvanized
¼ inch	$2.04	¼ inch	$2.86
⅜ "	2.04	⅜ "	2.86
½ "	2.72	½ "	3.57
¾ "	3.16	¾ "	4.31
1 "	4.54	1 "	6.19
1¼ "	6.19	1¼ "	8.44
1½ "	7.43	1½ "	10.13
2 "	9.90	2 "	13.50
2½ "	15.80	2½ "	21.56
3 "	20.75	3 "	28.31

Malleable fittings — Canadian discount, 40 and 12½ per cent.

Cast iron fittings, 65; headers, 65; flanged unions, 70; malleable bushings, 67½; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70 and 10; malleable lipped unions, 67½ per cent.

Plain steel bars, $2.25.

Square twisted bars, ¾ to 1¼, $2.35.

Soil Pipe and Fittings

Medium and extra heavy pipe and fittings, up to 6-inch, 65 per cent.

7 and 8-inch pipe, 50 per cent.

Sewer Pipes

4 in.	25c ft.	15-in.	1.35 ft.
6 in.	40c ft.	18-in.	1.90 ft.
9-in.	65c ft.	20-in.	2.25 ft.
12 in.	1.00 ft.	24-in.	3.25 ft.

all less 65 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.80.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.55.

Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.45.

Burnt River rubble stone delivered, $15 to $16 per toise.

McMYLER DERRICKS FOR SALE

Locomotive cranes, clam shell buckets, hoisting engines, steam shovel, pile driver, steam hammer, diving suits, stiff leg derricks, turn over buckets, two (2) marine engines, boilers, fuel lighter with whirley aboard. Address

CLEVELAND & ERIE MACHINERY CO.
1515 Rockefeller Bldg., Cleveland, O.

Rails for Contractors, Switches, Girders, etc.
New and Second Hand.

Locomotives and Cars

JOHN J. GARTSHORE

58 Front Street W., TORONTO

The
Laurentian Granite Co.
Limited
MANUFACTURERS OF
Building Granite, Granite Setts, Curbing, Crushed Granite

Samples Furnished and Prices Quoted on Application

Rose and Pink Granite Quarries at Staynerville, P. Que., Co. Argenteuil, on C.P.R.

Bank of Ottawa Bld'g.
224 St. James St.
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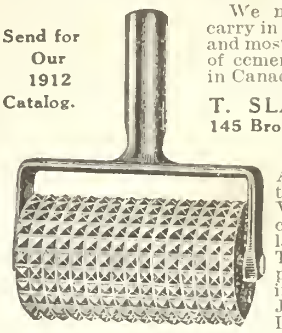
Montreal

Cement Sidewalk Tools

Send for
Our
1912
Catalog.



We manufacture and carry in stock the largest and most satisfactory line of cement sidewalk tools in Canada.

T. SLACK & CO.
145 Brock Ave., Toronto

Representatives

A. Bremner, Montreal. Forbes & Van Horn, Vancouver. H.S. Howland, Sons & Co., Toronto. Winnipeg Tool & Forging Co., Winnipeg. J. H. Ashdown, Ltd., Winnipeg.

J. HARVEY
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Driller of Oil, Gas, Salt or Artesian Wells
Deep Wells a Specialty

20 YEARS' EXPERIENCE IN CANADIAN OIL FIELD

Contracts taken in any part of Canada. Several years experience in Artesian Wells for Municipal Water Works. Estimates or geological information cheerfully furnished.
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A Chance to Save on Sidewalk Tools

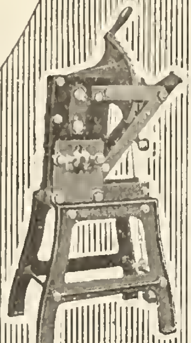
"Abram Sidewalk Tools have no competitor. They are the [illegible] only automatic "Unit Motion" long handled tools. Write at once for our special December discount offer and catalog free. Every set sold with a guarantee.

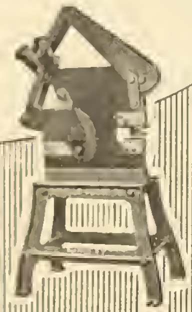
Abram Cement Tool Co.
105 Ouellett Avenue
WINDSOR ONTARIO

"Buffalo" **Punches Shears and Drills**

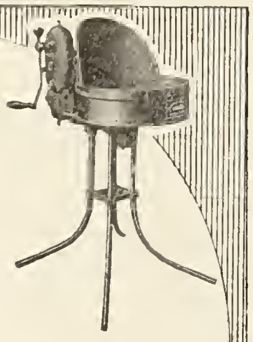
Among our recent designs is the Bar Cutter No. 10 for cutting concrete reinforced bars—twisted, round or any other shape. It cuts bars up to 1¼" thick and, due to its steel frame, its **weight is only half** that of a cast iron machine of the same capacity. Ask for catalog of Steel Punches, Shears and Drills No. 145.

Canadian Buffalo Forge Co.
MONTREAL Limited
St. John Winnipeg
Toronto Vancouver





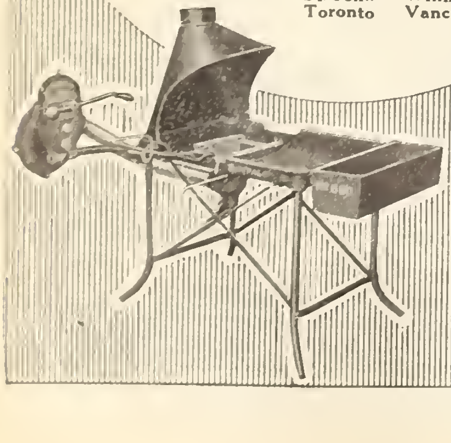
"Buffalo" **Forges**



"Built to Last"

is the slogan of our **1912 Rivet Forge.** The repair cost by this design is guaranteed to be actually **cut in two,** compared with any other forge now in the market. A bridge company using a large number of forges writes us regarding it: "The operator claims it runs easier and heats more rivets in less time than any forge he has ever used." Let us send you one on free trial. Fifty other styles, for light and heavy work.

Canadian Buffalo Forge Co.
Montreal Limited
St. John Winnipeg
Toronto Vancouver



STRUCTURAL WATER-PROOFING

Hydratite No. 2 (Paste)

is the logical agent for water-proofing concrete by incorporating it in the gauging mixture.

Hydratite No. 1 (Powder)

is mixed with the cement for water-proofing concrete.

These materials embody the "INTEGRAL METHOD" a term originated by us and widely copied.

Dehydratine No. 1—A damp-proofing agent applied to inner walls—a furring substitute.

Dehydratine No. 2—A colorless material for external application on masonry.

Dehydratine No. 3.—For backing up cut stone—prevents staining of same.

Dehydratine No. 4—A foundation compound for walls, footings, etc.—renders same waterproof.

Dehydratine No. 6—A plastic material to be trowled on rough foundation surfaces against pressure.

Dehydratine Mastixement—A bituminous material used as a binder for Minerva Irish Felt.

Minerva Irish Felt—Considered by Engineers the best waterproofing medium in foundation work where pressures are to be met.

"The Dehydratines possess elasticity and durability which insure their permanence in the structure"

Hydratite—An inert substance for water-proofing concrete, stucco, etc.

Symentrex—A water-proof cement coating made in colors, for all exterior masonry surfaces and concrete floors.

Symentrin—"A near relative" to Symentrex, for interior plastered surfaces.

Bondsit—Bonds new to old concrete.

For Fifteen Years Standard of Their Kind.

PINCHIN-JOHNSON & CO.
(CANADA), LIMITED

Manufacturers of the Famous British Brands of Minerva

Paints & Varnishes.

Send for Catalog and Complete Information

Toronto, Canada **London, England**

Water-proofing Agencies:—

Hyde & Webster, Montreal. Waite-Fullerton Co., Limited, Winnipeg. Wm. N. O'Neil & Co., Vancouver. Saskatchewan Supply Co., Limited, Saskatoon, Sask. Western Supply & Equipment Co., Calgary. J. L. Lachance Co., Limited, Quebec, P.Q. Western Steel & Supply Co., Regina, Sask. Twin City Sand Co., Fort William and Port Arthur, Ontario. E. F. Stevens, Halifax, N.S. T. Sydney Kirby Co., Ottawa, Ont.

"The Minerva Emblem Stands for Reliability"

ADANAC RED CORE RUBBER COVERED WIRES AND CABLES

RUBBER COVERED WIRES AND CABLES TRADE ADANAC MARK

Are made according to the specifications of the National Board of Fire Underwriters. The conductors are drawn from copper of the highest conductivity and are covered with two thicknesses of thoroughly vulcanized rubber compound of high quality. The wires are braided over insulation and the smooth high finish they receive makes them specially desirable for conduit work.

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Limited
MONTREAL

The Northern Electric and Manufacturing Co. Limited
Sales Agents

TORONTO REGINA WINNIPEG
CALGARY EDMONTON VANCOUVER

Save 75 cents a day on each Bricklayer

Possible with RENFREW LIME and you can lay 200 more bricks a day.

"Renfrew" will make more mortar per 100 lbs. of lime and it sets very hard.

Bricks are easily bedded down when "Renfrew" Lime is used.

Try it and be convinced.

"RENFREW" the LIME of QUALITY

Jamieson Lime Company
Renfrew, Ontario

White Lime - Stone - Grey Lime - Brick - Drain Tile

"Industrial Works" CRANES

Wrecking, Locomotive and Coaling Cranes

In Capacities of from Five to One Hundred Tons

For use about

Railroads, Manufacturing Plants, Coaling Stations, Quarries, Railroad Yards, etc.

"Industrial Works" Cranes embody all those features of practical utility which make for the economical solution of lifting and handling problems in the modern industrial plant. From the very smallest to the largest, their lifting capacity, integral strength, rigidity and speed have been proven by actual service tests all over the country.

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F. H. Hopkins & Co.

MONTREAL

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